A Dissertation on

A STUDY ON EARLY ENTERAL FEEDING IN CASES OF INTESTINAL ANASTOMOSIS

Dissertation Submitted to

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

in partial fulfillment of the regulations for the award of the degree of

M.S. GENERAL SURGERY

BRANCH – I

GOVT. STANLEY MEDICAL COLLEGE & HOSPITAL

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI, TAMIL NADU.

APRIL - 2013

CERTIFICATE

This is to certify that the dissertation entitled **"A STUDY ON EARLY ENTERAL FEEDING IN CASES OF INTESTINAL ANASTOMOSIS"** is a genuine work done by **Dr.R.SRINIVASA KUMARAN**, for the partial fulfillment of the requirements for **M.S. Branch – I (General Surgery)** Examination of the TamilnaduDr.M.G.R. Medical University to beheld in APRIL 2013. Under my supervision and the guidance of **Prof.Dr.J.VIJAYAN** Department of General Surgery, Government Stanley Medical College and Hospital.

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DECLARATION

I, **Dr.R.SRINIVASA KUMARAN,** solemnly declare that dissertation entitled, **"A STUDY ON EARLY ENTERAL FEEDING IN CASES OF INTESTINAL ANASTOMOSIS"** is a bonafide work done by me in the Department of General Surgery at Govt.Stanley Medical College & Hospital, Chennai,under theguidance of. **Prof. J.VIJAYAN, M.S.,**Additional Professor of Surgery, unit Chief, Government Stanley Medical College and Hospital, Chennai-600 001.

The dissertation is submitted to Tamilnadu Dr. M.G.R. MedicalUniversity, Chennai in partial fulfillment of the University regulations for the award of **M.S. Degree (Branch – I) in General Surgery**examination to be held in April 2013.

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Date :

(Dr.R.SRINIVASA KUMARAN)

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INTRODUCTION

Post-operative starvation was the most common practice after gastro intestinal surgeries. Conventional method of feeding is to keep the patient nil by mouth during the post operative period to improve patient compliances and to protect the anastomotic site.

After intestinal anastomosis, conventional feeding protocol is to keep the patient nil per oral till the patient shows signs and symptoms of gut motility, thereby preventing signs and symptoms of post-operative ileus and to reduce the incidence of anastomotic leak. After major gastrointestinal surgeries, the small intestine (jejunum) will shows normal motility

4 – 8 hrs after surgery. Postoperative ileus is usually transient and feeding within 24 hours after intestinal anastomosis is well tolerated by the patients. There are studies which has shown that early enteral feeds have a positive effect on gut motility thereby reducing post-operative ileus and increasing patient compliance.

INSTITUTIONAL ETHICAL COMMITTEE, STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : A study on early Enteral Feeding in cases of Intestinal Anastamosis

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The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 06.03.2012 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

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CONTENTS

INTRODUCTION

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After intestinal anastomosis, conventional feeding protocol is to keep the patient nil per oral till the patient shows signs and symptoms of gut motility, thereby preventing signs and symptoms of post-operative ileus and to reduce the incidence of anastomotic leak. After major gastrointestinal surgeries, the small intestine (jejunum) will shows normal motility 4 – 8 hrs after surgery. Postoperative ileus is usually transient and feeding within 24 hours after intestinal anastomosis is well tolerated by the patients. There are studies which has shown that early enteral feeds have a positive effect on gut motility thereby reducing post-operative ileus and increasing patient compliance.

Average gastric and pancreatic secretions is about one to two liters of fluid daily, which is absorbed in the small intestine. Any patient who had undergone intestinal anastomosis tolerate this high amount of endogenous secretions .And also starvation increases insulin resistance and reduces muscle function, thereby changing body metabolism. And

studies have shown that early enteral feeding and proper maintenance of post-operative nutritional status of the patients have significantly reduced wound healing and reduced the risk of post-operative sepsis because of decreased bacterial translocation through gut mucosa .These findings are in favor of early enteral feeding following intestinal anastomosis .

REVIEW OF LITERATURE

- In a study conducted by Prof.Pencho de Tonchev et al at the university hospital, Pleven,1773 patients underwent emergency upper GI surgeries,434 pateints were started on early enteral feeding (within 3 days of surgery)and 1339 patients were started on late feeding .mortality, length of icu stay and complications were studied.general and gastro intestinal complications showed no statistical significances in both groups.early enteral feeding was found to be beneficial in patients undergoing emergency upper GI surgeries.

- In a study conducted by Stephen .J.Lewis et al,a systematic review and meta analysis of Randomized control trials comparing enteral feeding within 24 hours of surgery with nil by mouth after elective intestinal surgeries.eleven studies with 837 patients were included.in 6 studies the study group were given direct enteral feeds and in 5 studies via the oral route.early feeding was found to reduce the risk of infection,length of stay in hospital,anastomotic dehiscence and mortality.

- In a study conducted by prof.sharma et al,a comparison was made on the feasibility,efficacy and safety of early feeding vs conventional feeding in elective enteral anastomosis.

  A 3 year comparative study was conducted on 50 patients undergoing elective intestinal anastomosis,25 pateints were started on oral feeds within 6 hrs of surgery, while the control group was started on feeds by conventional methods. Data was collected with regard to appearance of bowel sounds,time of passage of flatus/stools, surgical site infection, anastomotic leak, and mean hospital stay. Conclusion: early enteral feeding is well tolerated, helps in wound healing and anastomotic healing.

THEORY ASPECT

ANATOMY OF THE STOMACH

The stomach is the dilated part of the alimentary canal between esophagus and the small intestine , has a capacity of 1500ml . it mixes the food with gastric secretions to form the chime . it is situated in the upper part of the abdomen , extending from beneath the left coastal margin region into the epigastrium and umbilical regions.

It is roughly J shaped and has two opening cardiac and pyloric orifices, two curvatures , greater and lesser curvatures and two surfaces , anterior and posterior surfaces.The greater omentum , called policeman of the abdomen hangs from greater curvature

The two opening of the stomach , both the cardiac and the pyloric opening were guarded by esophageal and pyloric sphinters respectively .They act to keep the food in stomach , thereby aid in digestion and

absorption .The lesser curvature forms the right border of the stomach , is suspended from the liver by the lesser omentum. The greater curvature forms the left border of the stomach.

GASTRIC SURFACES

- Antero superior
- Postero superior(stomach bed)- left adrenal gland ,left kidney, pancreas-anterior aspect, splenic flexure of colon and transverse mesocolon.
- Postero inferior surface

BLOOD SUPPLY

5 main arteries:	Left gastric from the coeliac artery
	Right gastric from common hepatic artery
	Right gastro-epiploic from gastro duodenal artery
	Left gastro-epiploic & short gastric from splenic artery

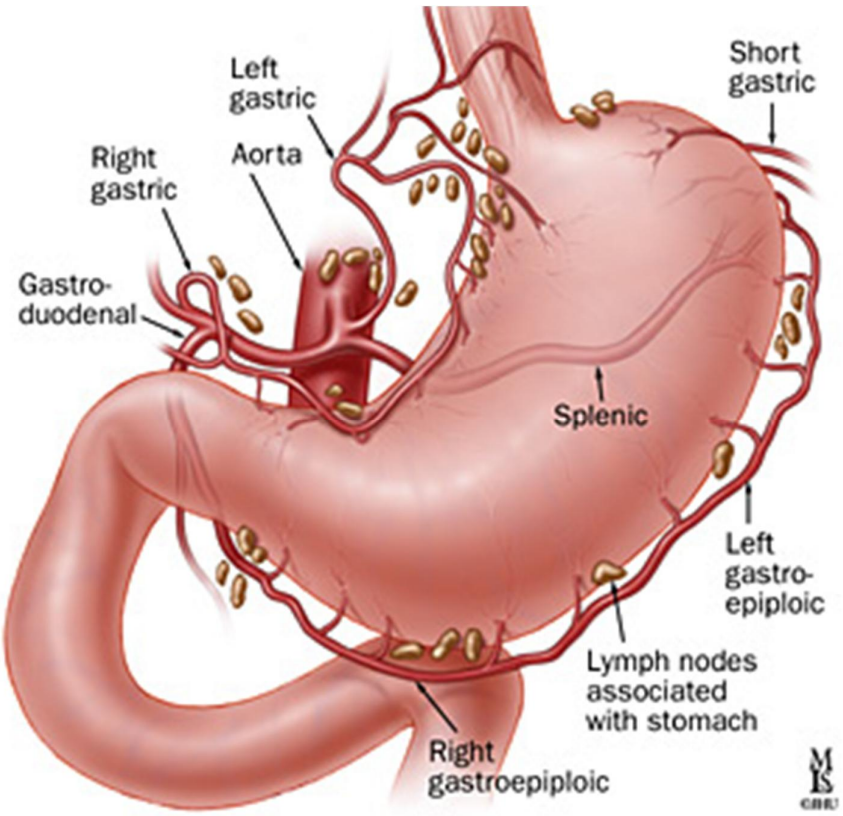
LYMPH NODES DRAINING THE STOMACH:

Hepatic group

Subpyloric group

Gastric group

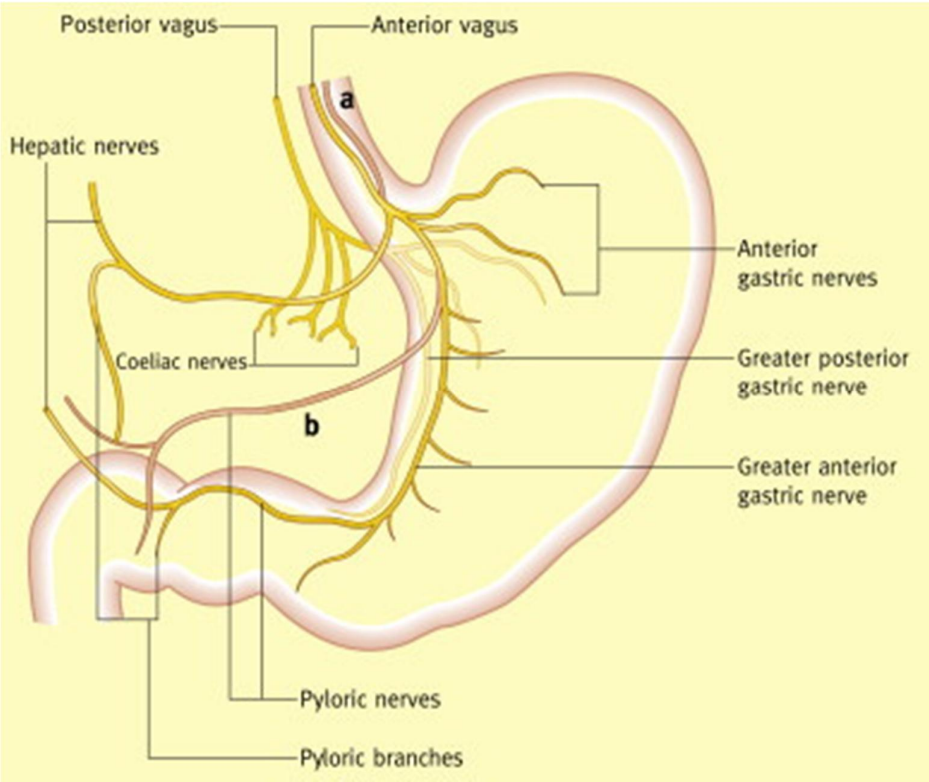
Pancreaticolienal group



NERVE SUPPLY

Parasympathetic (stimulant) plexus: right and left vagus nerves

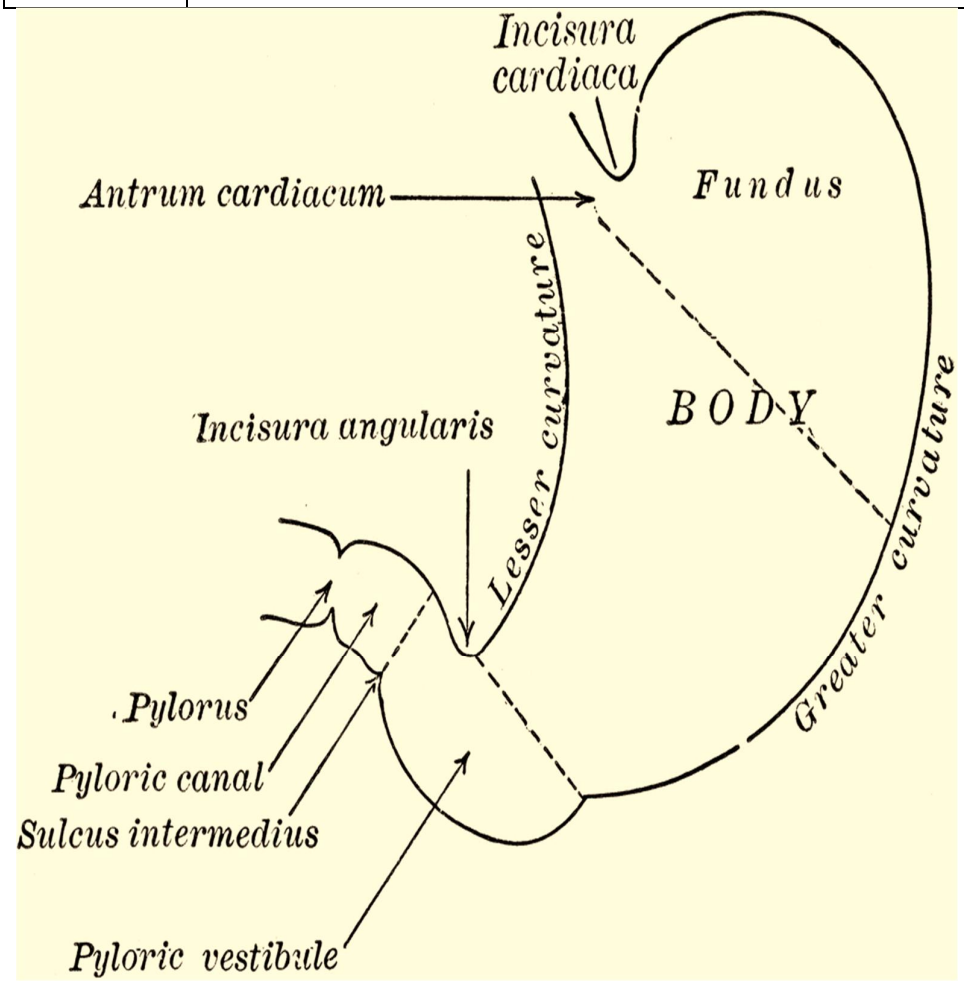
The anterior vagal trunk , which is formed in the thorax mainly from the left vagus nerve , enters the abdomen on the anterior surface of the esophagus. It divides into multiple branches that supply the anterior surface of the stomach. The posterior vagal trunk , formed mainly from the right vagus nerve , enters the abdomen on the posterior surface of the esophagus Sympathetic (inhibitory)plexus:T6-T8 , arise from celiac plexus



SECTIONS

The stomach is divided into four sections:

Cardia	Junction of esophagus and the stomach
Fundus	Upper part
Body	Central region.
Pylorus	Junction between stomach and small intestine.



LAYERS OF STOMACH

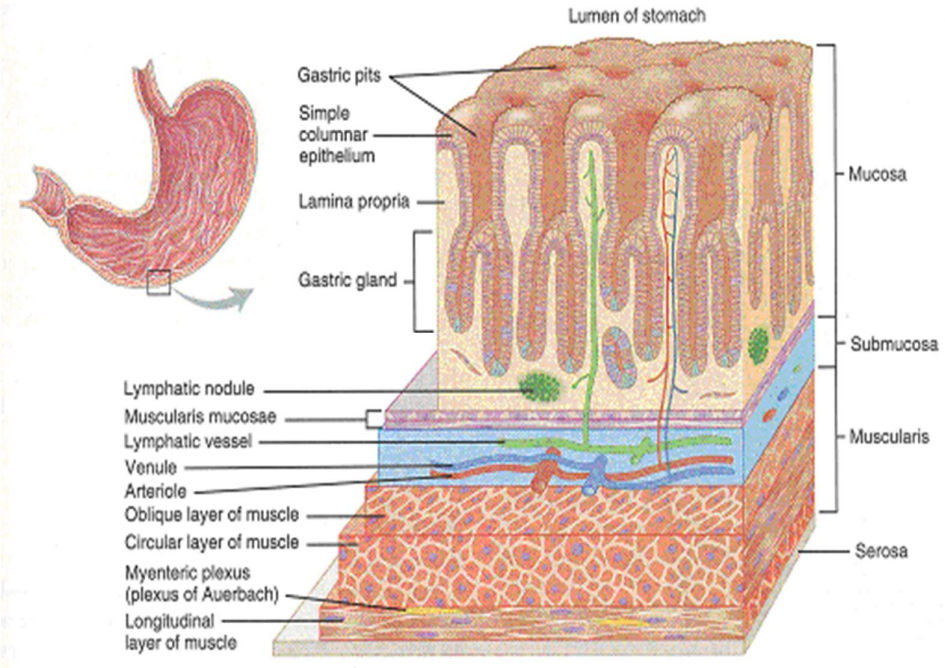
1st layer: mucosa- thick layer with longtitudinal folds called rugae, contains all secretory cells

2nd layer:submucosa-loose areolar tissue

3rd layer: muscularis mucosa- inner circular and outer longtitudinal muscles

4th layer:mucularis propria- inner oblique,middle circular & outer longtitudinal

5th layer: serosa- deficient over the attachments of greater and lesser omentum and the postero inferior surface



GASTRIC GLANDS

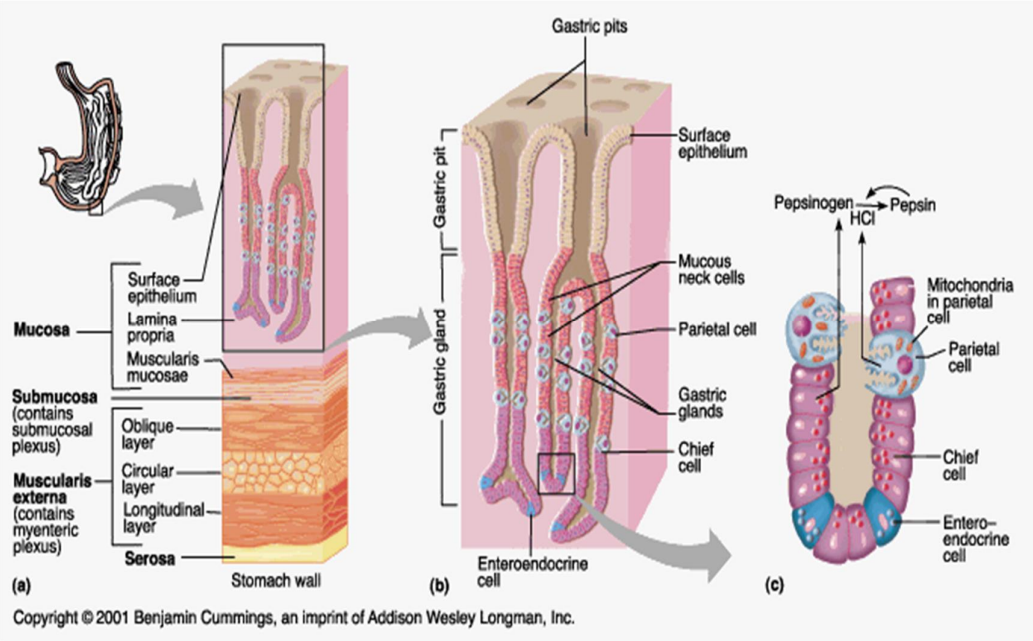
Cardia: mucous cells, undifferentiated cells, endocrine cells

Fundus and body: Acid producing parietal cells

Pepsinogen producing chiefcells

Intrinsic factor

Antrum: parietal cells, mucous cells and g- cells producing gastrin



GASTRIC SECRETIONS

1. Acid secretion occurs in 3 phases-cephalic phase, gastric phase, intestinal phase. acid secretion is inhibited by increasing acidity in antrum and the duodenum by negative feed back mechanism.

2. Pepsin secretion: pepsinogen becomes pepsin below pH 5,initiates protein hydrolysis,stimulates gastrin and CCK release, Stimulated by : gastrin ,histamine ,vagal stimulation Inhibited by: somatostatin

3. Mucus and bicarbonate secretion: protect stomach mucosa from acid damage. Stimulated by: PGE2 and by vagal stimulation.

4. Intrinsic factor

GASTRIC PERISTALSIS

Gastric secreions and motility are under neural and hormonal control

Gastrin, a peptide hormone secreted by the G cells , predominantly distributed in antrum of stomach stimulates the secretion of hydrochloric acid from parietal cells and pepsinogen from chief cells. They also found to have a positive effect on gatric motility

Cholecystokinin , a small intestinal peptide hormone , increases both pancreatic secretions and bile . it causes contraction of gall bladder . it inhibits gastric secretion and its secretion is inhibited by stomatostatin

Secretin is also a small intestinal hormone secreted in the duodenum , in response to acid in the first of duodenum . it decreases the gastric secretion and increases pancreatic secretions

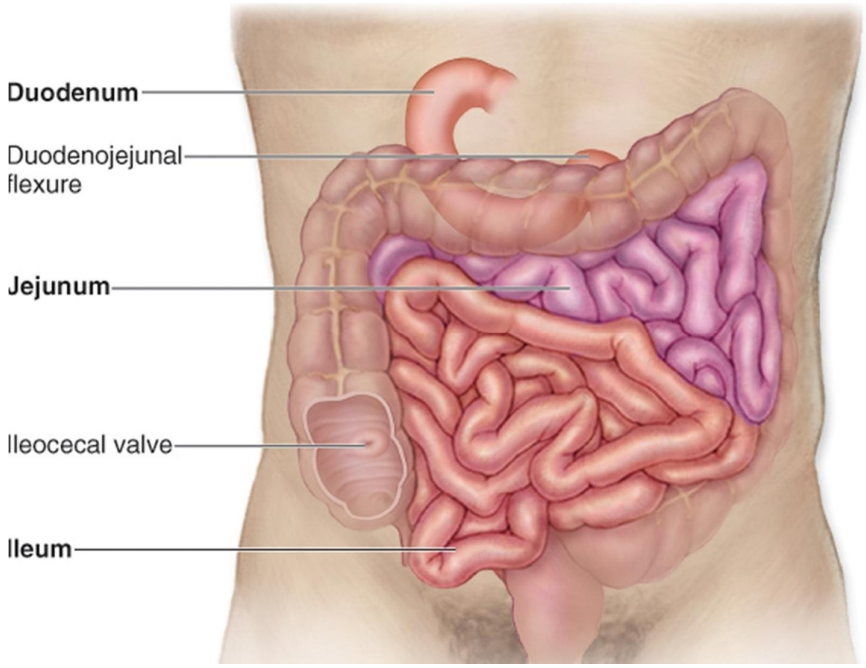
ABSORPTION

Stomach can absorb:

- Water,when dehydrated
- aspirin
- Amino acids
- Alcoholic beverages

ANATOMY OF THE SMALL INTESTINES

Small intestine is the longest part of the gut . most of the digestion and absorption occur here



DIVISIONS

The small intestine is divided into three structural parts:

- **Duodenum** :the duodenum is a C shaped tube about 25 cms in length , it receives the opening of bile and pancreatic ducts . Duodenum is divided into 3 parts , the common bile duct and the accessory pancreatic duct opens into the 2nd part of dodenum

- **Jejunum** : the jejunum lies coiled in the upper part of the peritoneal cavity below the left side of the transverse mesocolon , it is wide bored , thick walled than ileum

- **Ileum:** ileocecal valve at the junction of ileum with caecum prevents flow of food from caecum to ileum . peyer’s patch densely seen

UNIQUE MODIFICATIONS IN THE SMALL INTESTINAL MUCOSA

- Plicae circulares : these are permanent ridges in the mucosa that aid in peristalsis and digestion.

- Villi – finger-like projections seen in the mucosa , aids in absorption by vastly increasing the surface area of absorption .

    - Crypts of Lieberkühn- intestinal crypts that occur between two villi

- Presence of intestinal glands

- Microvilli –give brush border appearance to the lumen

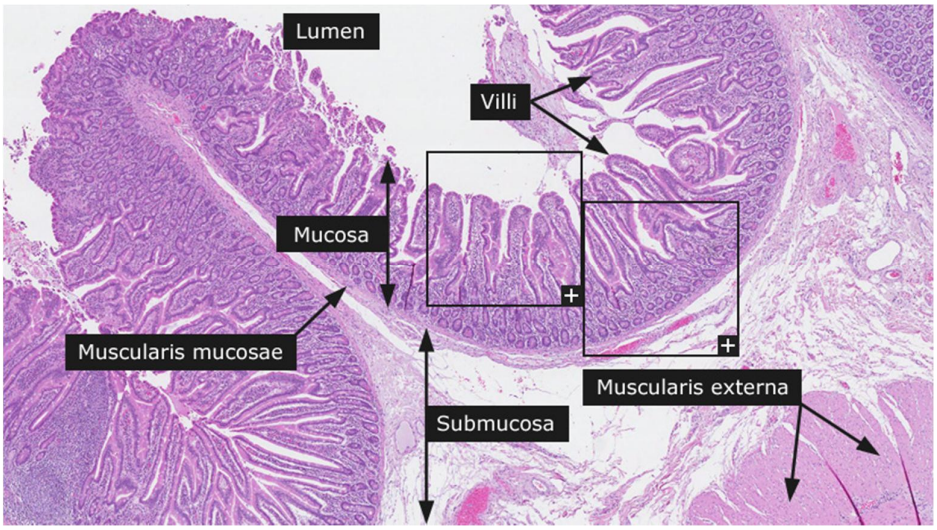
Each villi is composed of:

- Absorptive cells produce the brush border enzymes that digest nutrients

- Paneth cells, secrete lysozyme that destroys bacteria.

- Brunner s gland: found in submucosa ,secretes mucus

- Peyers patches: lymphatic nodules in the submucosa that form a defensive barrier



DIGESTION AND ABSORPTION

Food enters the duodenum via the pyloric sphincter.

Cholecystokinin is the major stimulator of digestive enzymes

- Proteins: are degraded into small peptides and amino acids by proteolytic enzymes, like trypsin and chymotrypsin, secreted by the pancreas
- Carboxypeptidase, : protease enzyme.
- Fatty acids and glycerol are the end products of fat digestion. Bile salts emulsify the triglycerides which are broken down by pancreatic lipase into free fatty acids and monoglycerides.
- Carbohydrates are digested by pancreatic amylases and brush border enzymes like dextrinase,maltase,glucoamylase,sucrose and lactases and broken down into oligosaccharides and monosacchrides.further certain sugars are degraded by intestinal bacteria

ABSORPTION

- Digestion of starch occur by both salivary and pancreatic amylase , which is then transported by secondary active transport along with sodium
- Free amino acids are absorped by co-transport along with sodium

ANATOMY OF LARGE INTESTINE

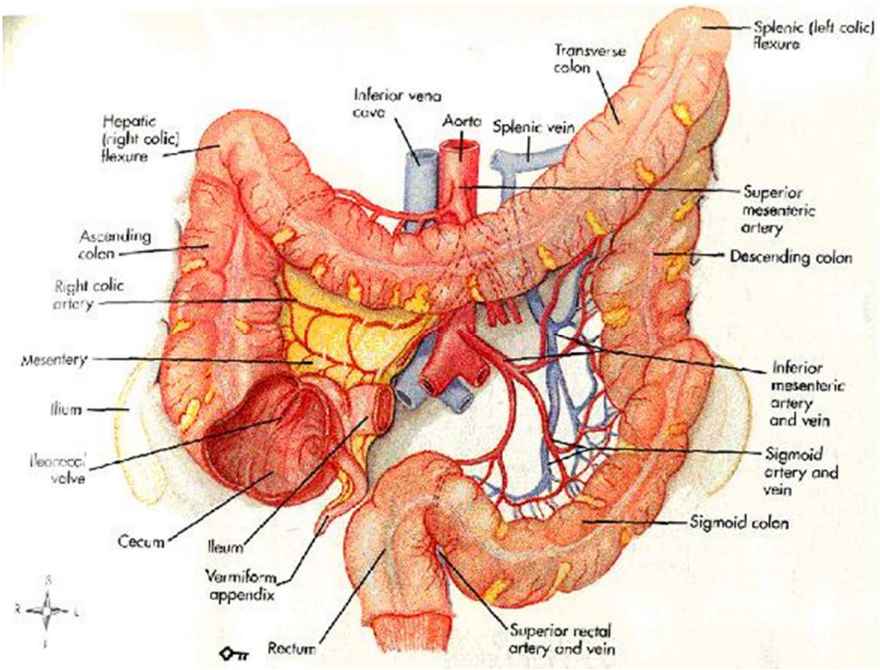
INTRODUCTION

Measuring about 1.5metres long it plays a pivotal role in absorption

Taenia coli –longtitudinal muscle fibres

Appendices epiploacae-fat strands over the colon

Haustra-sacculations

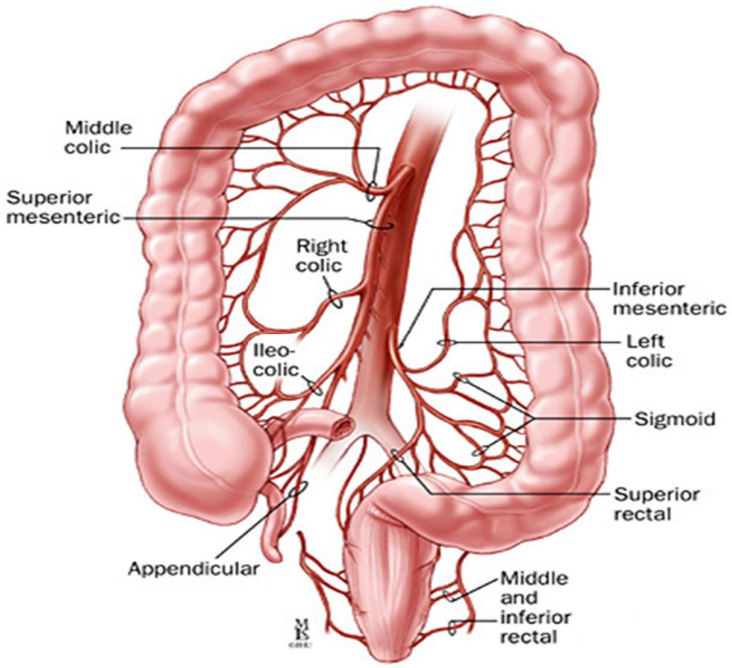


CAECUM AND APPENDIX

- The caecum is that part of the large intestine that lies below the level of the junction of the ileum with the large intestine .it is a blind ended pouch situated in the right iliac fossa. Although it does not have a mesentery , it possess a considerable amont of mobility . Blood supply from the anterior caecal and posterior caecal arteries , from ileocolic artery , which inturn is a branch of SMA

THE COLON

- The colon is divided into
    - Ascending colon : it is about 13 cms long , lies in right lower quadrant . it extends from the caecum to the inferior surface of right lobe of liver
    - Transverse colon : it is 38 cms long , and the position of transverse colon is extremely variable , sometimes reaches as far as pelvis
    - Descending colon : it is about 25 cms long
    - Sigmoid colon



THE RECTUM

- **BLOOD SUPPLY**
    - Superior rectal artery : inferior mesenteric artery
    - Middle rectal artery : internal iliac artery
    - Inferior rectal artery : internal pudendal artery
- Venous drainage corresponds to arterial supply

FUNCTION

Water Absorption:. By an osmotic gradient, Na+ is absorbed actively and Cl- passively

Vitamin Absorption: Bacterial colonization produces vitamins that are absorbed

Storage and Defecation: Faeces contains water,waste and undigested food. Defecation is the periodical expulsion of faeces into the environment.

Defense Against Pathogens:

Mucus inhibits contact and protects the mucosal surface. Bile kills bacteria

Epithelial tight junctions prevent bacterial entry

Commensals competitively inhibit growth of pathogens

Continuous peristalsis discourages persistence of toxins and aids in their elimination from the gut.

The lamina propria contains macrophages, B and T lymphocytes, plasma cells, and mast cells

INNERVATION

Parasympathetic: stimulates peristalsis

Sympathetic:coeliac,cranial and caudal mesenteric plexuses

LYMPHATICS

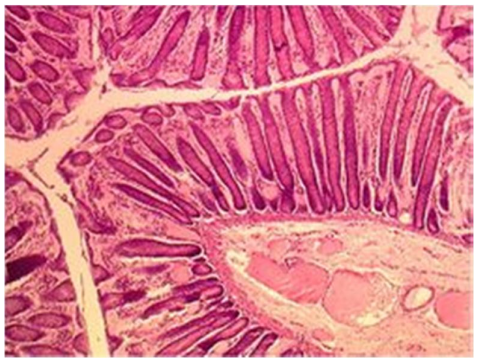
Lymph nodes of large intestine:

The caecal - drains the caecum.

The Colic - drains the ascending and transverse colon.

The efferent vessels of these lymph nodes converge to form the cranial mesenteric trunk which drains into the chyle cistern. The caudal mesenteric centre includes the lymph nodes of the descending colon, which are situated in the mesocolon. The efferent vessels of these lymph nodes converge to form the caudal mesenteric trunk which unites with the cranial mesenteric trunk to open into the chyle cistern.

Histology



- Donot contain villi or microvilli
- More no .of .goblet cells
- More no.of lymph nodules
- Thinner submucosa

ENTERAL NUTRITION

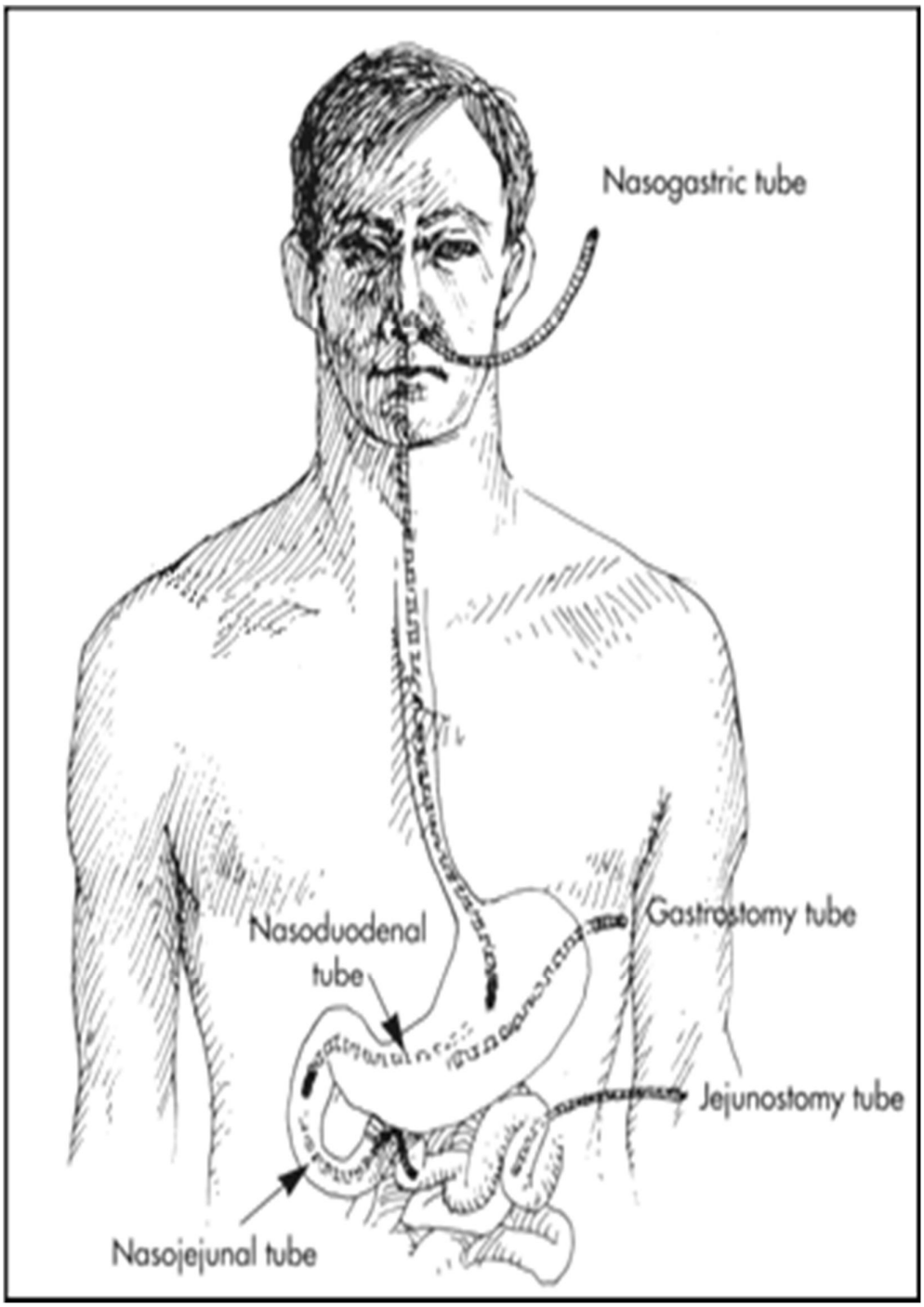
Gut starvation can affect surgical patients . Studies have shown that patient kept on nil by mouth for more than 14 days postoperatively have higher mortality rate compared with early fed patients

Nutritional support via placement of tubes through the nose, esophagus, stomach, or intestines (duodenum or jejunum)

- Must have functioning GI tract
- Costs less than parenteral nutrition
- Reduces risks associated with disease state
- Preserves gut integrity
- Decreases likelihood of bacterial translocation
- Preserves immunologic function of gut
- Increased compliance with intake

ROUTES OF ENTERAL NUTRITION:

- Oral
- Naso gastric
- Naso enteral:
    - nasoduodenal
    - naso jejunal
- Gastrostomy:
    - Percutaneous endoscopic
    - fluoroscopic
    - laparoscopic
- Pharyngostomy:
    - percutaneous
    - surgical
- Jejunostomy :
    - endoscopic
    - laparoscopic
    - fluoroscopic


Nasogastric tube
Nasoduodenal tube
Gastrostomy tube
Jejunostomy tube
Nasojejunal tube

CATEGORIES OF ENTERAL FORMULAS:

- **Feeds with standard intact nutrients:**
    - Contain whole protein nitrogen
    - Contain 1 kcal/ml
    - Lactose free
    - Comes in fibre rich and fibre free forms.
- **Elemental feeds**:
    - Contain predigested nutrients.
    - Low fat content
- **Fluid restricted feeds**:
    - high calorie content, about 2 kcal/ml
    - Has intact nutrients
- **Renal feeds**:
    - Contains low phosphorus and potassium
    - High calorie content
- Specific disease conditions : diabetes, liver failure ,respiratory failure.

SELECTION OF FORMULAS FOR ENTERAL FEEDS:

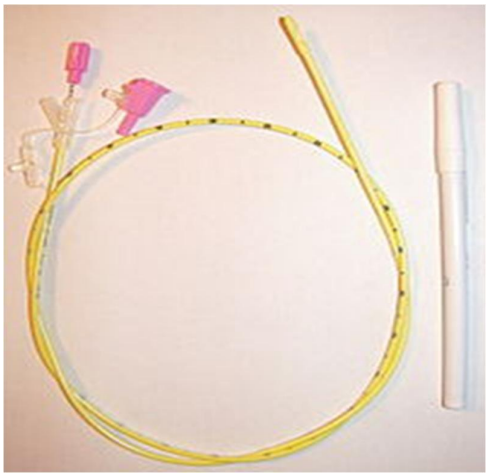
- When the patient has a normal absortive GIT- choose standard intact nutrients.
- When the patient has malabsorption select elemental or peptide formulas
- In renal failure patients with hyperkalemia and hyperphosphatemia,choose renal formula feeds.
- In over hydration, choose fluid restricted feeds.

SHORT TERM

These are utilized when the duration for enteral nutrition is temporary usually 6 – 8 weeks

Nasogastric

- Usually a large nasogastric tube 16 fg is used for aspiration , compared to a smaller nasogastric tube 3 mm for feeding .the procedure is explained to the patient before insertion . lubrication with lignocaine jelly is a must before insertion, at 40 cms gastroesophageal junction in adults is reached. position of the tube is checked by auscultation , aspiration of acidic contents and confirming its acidic nature by litmus test and radiographically.



- Nasogastric tubes must not be used in patients with facial and maxillary injuries
- Never feed the patient without confirming the position of the tube
- Not more than 3 attempts must be made by any one doctor for tube insertion.

CONTRAINDICATIONS:

- Nasopharyngeal obstruction
- Esophageal varices
- Coagulopathies
- Thrombocytopenias
- Craniofacial injuries
- Recent foregut surgeries

Nasojejunal

- It is also one of the methods of enteral feeding where the feeding tube is passed via nostrils into the jejunum . it is of immense use in patients who were found to have a delay in gastric emptying and also in patients who have shown disorders of gastric motility.
- Unconscious patients
- This procedure is technically difficult and challenging , since the tube has to be placed beyoun pylorus and checked radiographically , in cases of difficulty it could also be inserted with the aid of an endoscope or fluoroscopically
- As in the case of naso gastric tube insertion , naso jejunal tubes should also be avoided in cases of nasopharyngeal obstructions and patients with craniofacial injuries.
- Tube must have the following features:
- Must be radio-opaque
- Must have clear markings
- Must have caps
- Have multiple ports
- Available in varying lengths and sizes

12 Fr Naso jejunal tube

LONG TERM ACCESS:

In patients who require enteral nutrition for a prolonged period of time , the naso gastric/ jejunal cannot be utilized . hence other modalities of enteral feedings are to be used when duration of enteral feeding > 8wks.

GASTROSTOMY:

- OPEN
- PERCUTANEOUS

INDICATIONS:

- Head and neck cancers
- CVA
- Trauma
- Respiratory failure
- Prolonged intubation

CONTRA INDICATIONS:

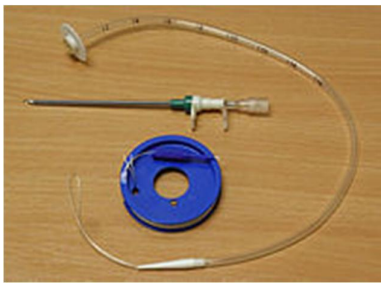
- GERD
- Gastroparesis
- Gastric outlet obstruction
- Pancreatitis
- Recent fore gut surgery

Percutaneous Gastrostomy Tubes (PEG)

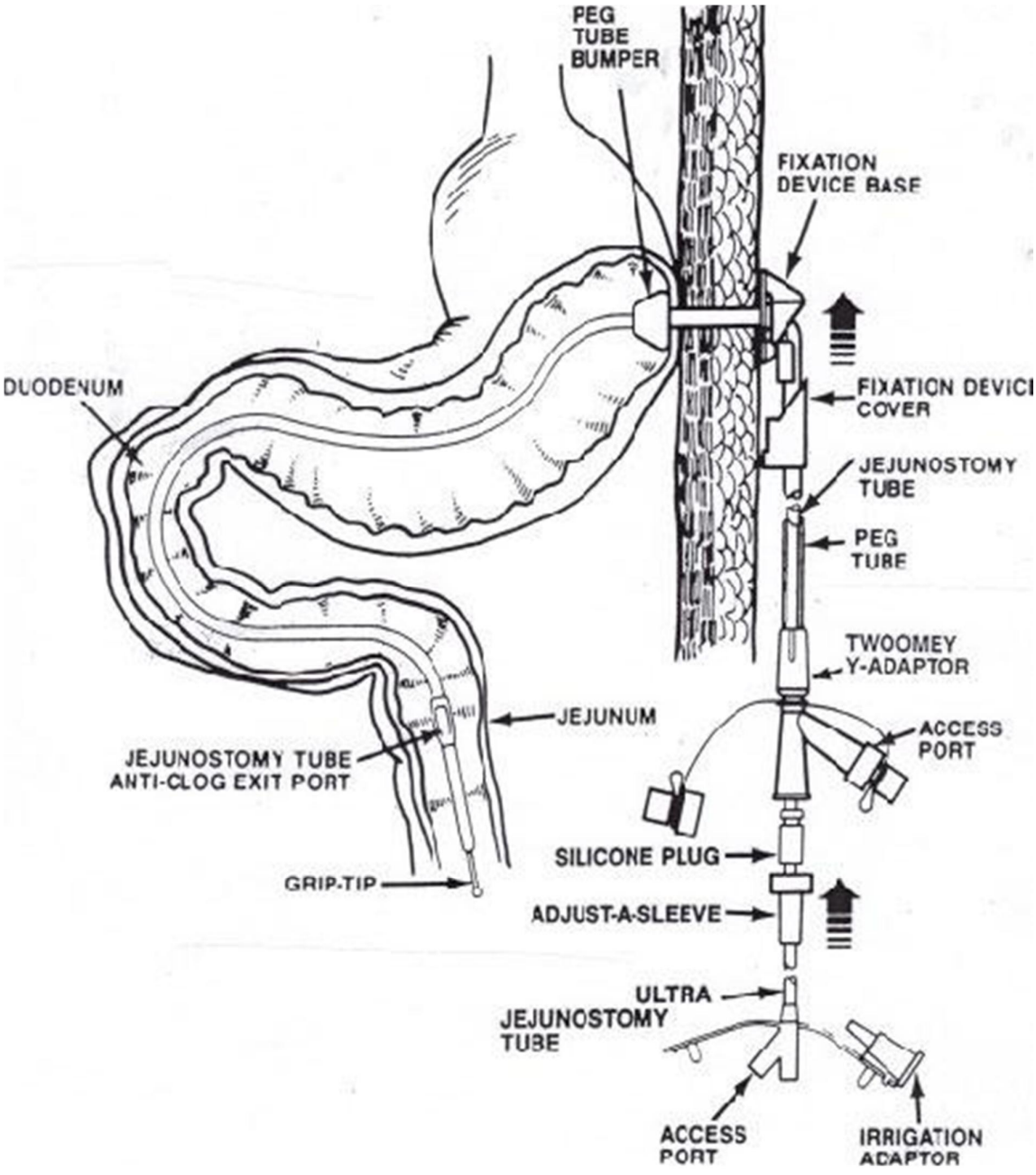
- A feeding tube is placed directly into the stomach using an endoscope, specifically for prolonged enteral feeding of the patients. It is of use in cases of aspiration associated with th use of naso gastric tubes and when compared with surgical ostomies for feeding purposes , it cost effective and with much lesser complications

Placement by two major techniques:

1. Gauderer-Ponsky technique
2. Russell introducer technique



PEG TUBE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Y-ADAPTOR
JEJUNUM
ACCESS
PORT
JEJUNOSTOMY TUBE
ANTI-CLOG EXIT PORT
SILICONE PLUG
GRIP-TIP
ADJUST-A-SLEEVE
ULTRA
JEJUNOSTOMY
TUBE
ACCESS
PORT
IRRIGATION
ADAPTOR

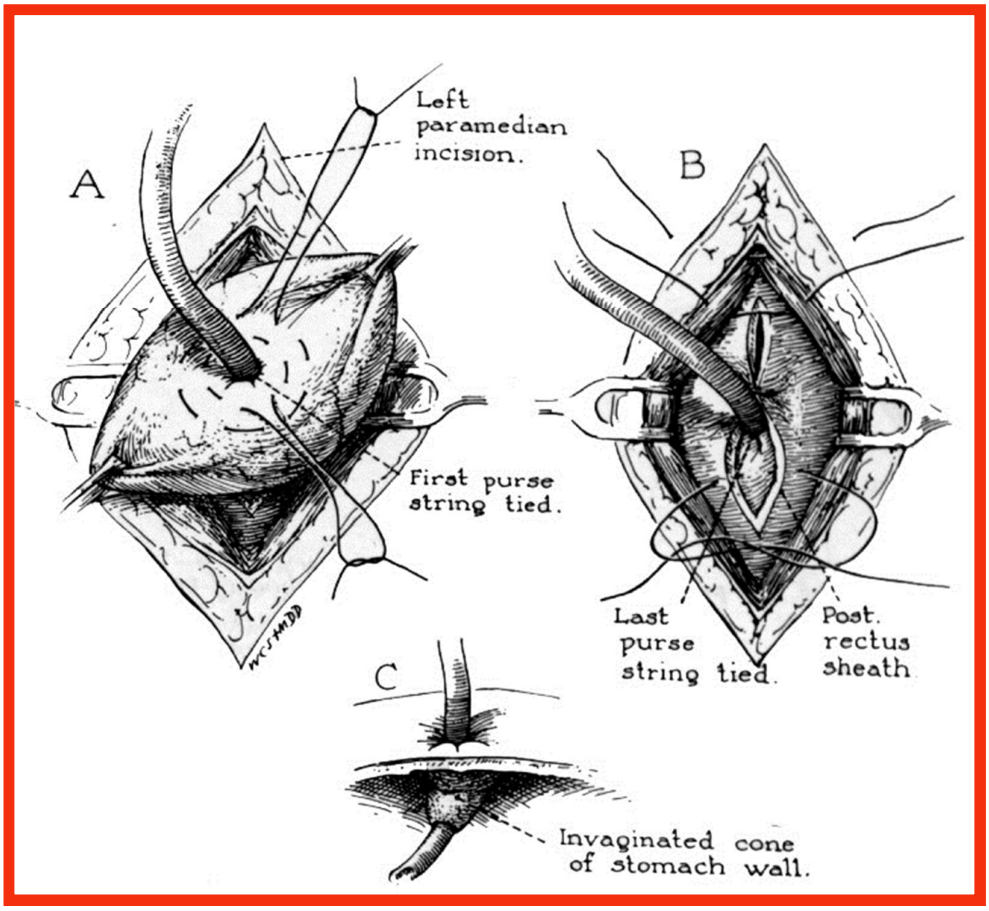
Open Gastrostomy:

This method of enteral feeding , where a surgically designed enterocutaneous fistulas are created for the purpose of enteral nutrition.these are to be avoided in patients with gastric variceal diseases, malignancy or infiltrative disease of stomach .

- The procedure developed by stamm in 1894 where by a prosthetic tube connects the stomach with the exterior , usually done during any surgical procedures for the purpose of post operative nutrition. In this a feeding tube is secured through an incision made in the anterior stomach wall and securing the stomach with the abdominal wall.

- Usually feeding cannot be started immediately following the procedure.Initiation of enteral nutrition by this route is done 24hrs after the procedure

- Usually a wide bore tube is used in this method, formulas used are to be isotonic , volume judged as per patient tolerance , gastric residuals should be checked 4 – 5 hrs

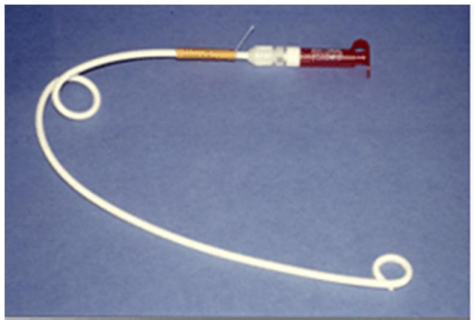


Transgastric Jejunostomy

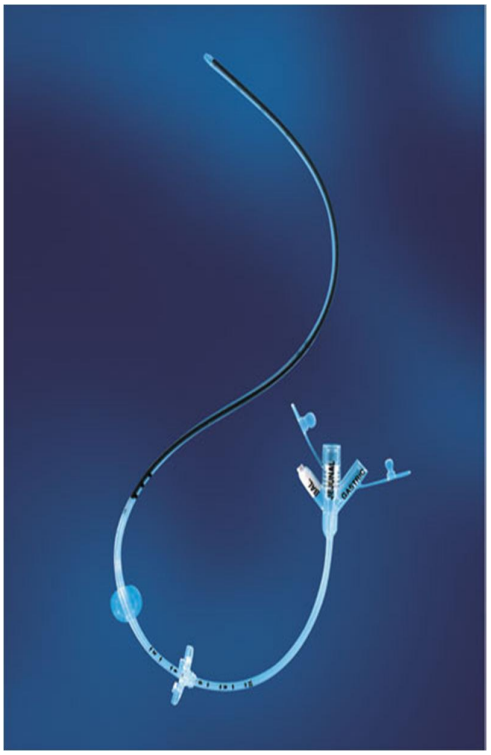
These have a combination of both gastrostomy and jejunostomy tubes, it has 2 portd for access . In this method the stomach is bypassed anf feeds are pushed into the jejunum . This is of use in patients having gastro esophageal reflux and patients in risk of aspiration and those not tolerating gastric feeding . The tubes needs to be changed once in 6 months. These are inserted either by

open surgery and can be done using an endoscopic . In this one cannot monitor residuals , to establish the patient tolerance

Cook catheter for transgastric jejunal (GJ) feeding



MIC transgastric jejunal feeding tube

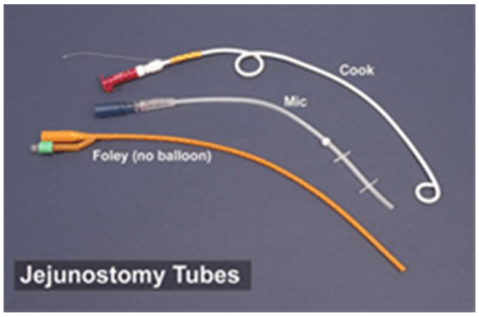


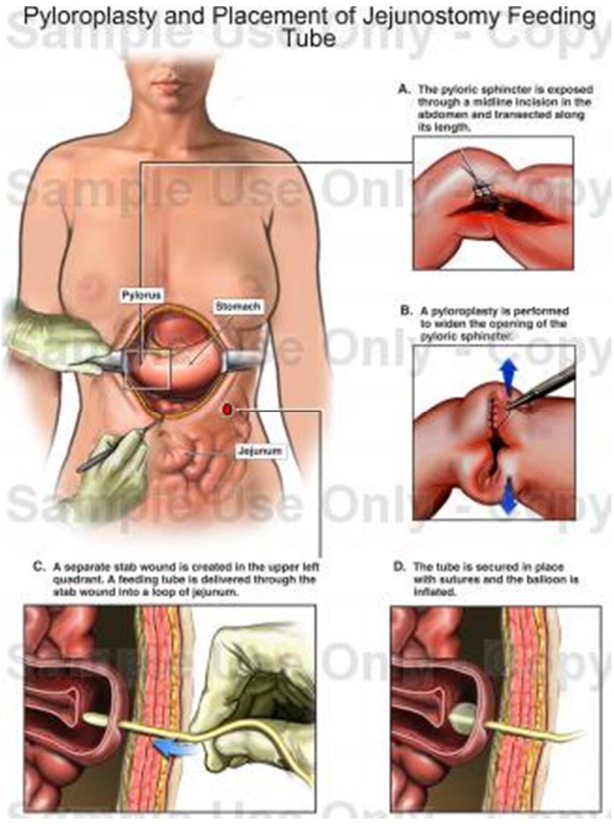
Jejunostomy

- A method of enteral nutrition , which is commonly practiced world over , where a prosthetic tube is inserted into the jejunum either by open surgical method or laparoscopically. It can be doe during any major gastrointestinal surgical procedures , gastric outlet obstruction and patients with high risk of aspiration.As in the case of open gastrostomy , here too the bowel wall is secured to the anterior abdominal wall by sutures.it can be used for long term enteral feeding , initiation of feeding could be started 12 hours post operatively

Witzel longitudinall jejunostomy

It uses segment of jejunum , that is 20 cm distal to the dj flexure , to allow the apposition of the jejunum to the abdominal wall ,the jejunum is attached with a gentle curve to the anerior parietal peritoneum to decrease the chance of volvulus and the tube is buried by seromuscular stitches of about 5 cms .the complications are similar to that of gastrostomy . Following witzel procedure , there are chances of obstruction , intra peritoneal leakage and tube dislodgement.


Cook
Mic
Foley (no balloon)
Jejunostomy Tubes


Pyloroplasty and Placement of Jejunostomy Feeding Tube
A. The pyloric sphincter is exposed through a midline incision in the abdomen and transected along its length.
Pylorus
Stomach
Jejunum
B. A pyloroplasty is performed to widen the opening of the pyloric sphincter.
C. A separate stab wound is created in the upper left quadrant. A feeding tube is delivered through the stab wound into a loop of jejunum.
D. The tube is secured in place with sutures and the balloon is inflated.

PROTOCOL FOR FEEDING

- Gastric feeding:

  Usually they are fed at rate of 50-60ml/hr.

  If well tolerated, every 4-6 hours the rate is increased by 25ml/hr.

  High calorie formulas:started at 25 ml/hr and after 12 hours must

  Must be increased to 25 ml/hr foe every 4- 6 hours,as with

  Elemental formulas.

- Jejunal/duodenal feeding:

  First 12 hours:25ml/hr.

  Every 6-12 hours: increase another 25 ml/hr ,if tolerated.

  Bolus doses avoided

  Use of dyes are harmful and hence not recommended

COMPLICATIONS:

- TUBE RELATED COMPLICATIONS
- FEED RELATED COMPLICATIONS

TUBE RELATED

1. INSERTION COMPLICATIONS

    - These are due to faulty insertions , since these are carried out blindly there is a chance of tube being misdirected into the bronchial passage .
    - There is a possibility of tube being displaced even after proper insertion due to prolonged vomiting. Hence forth the tube should always be checked every time before feeding. Care should be taken especially in unconscious patients , because their gag reflex will not be that of normal individual , thereby higher risk tube being misplaced.
    - May cause esophageal perforation and pneumothorax
        - Severe esophagitis

- PEG tube insertion : done under endoscopic guidance
- Carries a mortality risk of 7-10%
- Failure of insertion,peristomal infection,hemorrhage,leak may occur.peritonitis,colonic perforoation &necrotizing fasciitis are life threatening complications.
- Infection may be prevented by using broad spectrum antibiotics

2. ACCIDENTAL REMOVAL:

- About 50% of the naso enteral tubes are removed accidentally as they commonly are fixed with adhesive tapes.
- Chances of accidental removal is less in both gastro and jejunostomy

3. TUBE BLOCKAGE AND DAMAGE:

- Common with fine bore tubes(7/9 Ftubes)
- May occur due to crushed medications,proteins which precipitate
- Blockage can reduced to proper flushing of the tubes , usually with sterile water
- It is seen that blockage can be reduced by using pancreatic enzymes and there 10 times reduction in blockage.
- Tubes that wide bored have less incidence of tube obstruction, these are commonly used in gastro and jejunostomies.
- Buried –bumper syndrome: this occur in patients , where the gastric mucosa overgrows thereby causing tube block

- Gastrostomies last for 2-3 years with proper care

Gastrointestinal Complications

1. **ASPIRATION:**

- Common with large volume feeds
- Reflux of feed may cause pulmonary aspiration
- Common in unconscious patients
- Has an incidence of 30% in unconscious patients
- Risk reduced with:
  - propped up position
  - Iso-osmolar feeds
  - Slow infusions
  - Use of prokinetics

2. **G.I.T SYMPTOMS:**

- Commonly seen are nausea and abdominal bloatins sensation.
- May be due to mechanical obstruction

- Continuous infusions have a lower risk of these symptoms when compared to bolus feeds.

3. ALTERED BOWEL HABIT:

- Diarrhea : Common complication

  Multifactorial etiology

  Commonly due to use of broad spectrum antibiotics

  Occurs in 2-63% patients

  Reduced with fibre rich feeds

- Constipation : less common.

  Decreased bowel motility

  Decreased fliud intake

  Inactivity

  Lack of fibre in feeds

4. INFECTION:

- Feed formulas are good growth medium for bacteria

- Contamination is common with continuous infusions with incidence being 38%
- Enteral feeds must be changed every 24 hours
- Feeds increase the gastric pH ,thus increasing the gastric colonization

5.MAL ABSORPTION:

Manifested by:

- Weight loss
- Steatorrhoea
- Anemia
- Bony pain
- glossitis

6. METABOLIC COMPLICATIONS:

- Refeeding syndrome :

  Acute reduction in the circulating levels of potassium, magnesium and chloride,causing

  Cardiac dysrhythmias

  Cardiac failure

  Respiratory failure

Coma and paralysis

Nephropathy

Liver dysfunction

Occurs commonly in severely malnourished patients like those with- Anorexia nervosa, kwashiokar/marasmus, prolonged fasting, significant stress, electrolyte imbalances

- Hyperglycemia:

  Causes: diabetes

  Steroid therapy

  Pancreatitis

  Sepsis

  Trauma

Treated by insulin therapy

Blood sugars must be maintaine at around 110mg/dl

- Overhydration or hypertonic dehydration,
- Electrolyte imbalance.
- Hyponatremia:

  Due to dilution

Sodium loss

Treated by:

Changing to fluid restricted formulas

Discontinue iv fluids and water

Replace sodium

- Hypernatremia:

  Due to dehydration

  Diabetic state

  Treated by:

  Maintaining adequate hydration

- Hypokalemia:

  Occurs due to anabolism

  Use of diuretics/medications

  Treated by:

  Potassium supplementation

- Hyperkalemia:

  Due to renal failure

  Metabolic acidosis

  Catabolism

  Dehydration

  Gi bleed

  Treated by:

Change to appropriate formula feeds

- Hypophosphatemia:

  Due to refeeding syndrome

  Treated by:

  Phosphorus supplementation

- Hyperphosphaemia:

  Occurs in renal failure patients

  Treated by:

  Changing to renal formula feeds

  Addition of phosphate binders

- Hypomagnesemia:

  Refeeding syndrome

  Use of diuretics/medications

  anabolism

  Treated by:

  Magnesium supplementation

INDICATIONS FOR CONTINOUS FEEDING:

- For patients with high risk of aspiration & bloating
- Hence used in icu settings

- Short term feeding

INDICATIONS FOR INTERMITTENT FEEDING:

- Used for long term feeding
- Conscious and ambulant patients

INDICATIONS FOR NOCTURNAL FEEDING

- More useful to increase mobility

MONITORING TOLERANCE:

CLINICAL PARAMETERS:

- **TUBE PLACEMENT:**

  By auscultation

  By tube markings

  By aspirating gastric contents

- **GASTRIC RESIDUALS:**

  Measure the volume of fluid aspirated from the stomach

  Check every 4-6 hrs when output is <200ml

  Hourly output monitoring if >200ml

  Avoid further feeding if residual is >200ml

- **MONITORING GI SYMPTOMS:**

Monitor for abdominal bloating. When present Stop feeds and observe the patient closely.

Low fiber formulas and pro kinetic medications May be tried.

Nausea and vomiting Abdominal cramps and diarrhea,Respiratory status and vital signs : provide clues to Aspiration, infection, dehydration/ fluid over load.

- **WEIGHT MONITORING & OUTPUT MONITORING:**

  Daily monitoring ideal

  Ideal weight gain: 1 kg/ week

- **BIO CHEMICAL PARAMETERS:**

  Blood glucose- daily

  Serum electrolytes-daily

  LFT-weekly

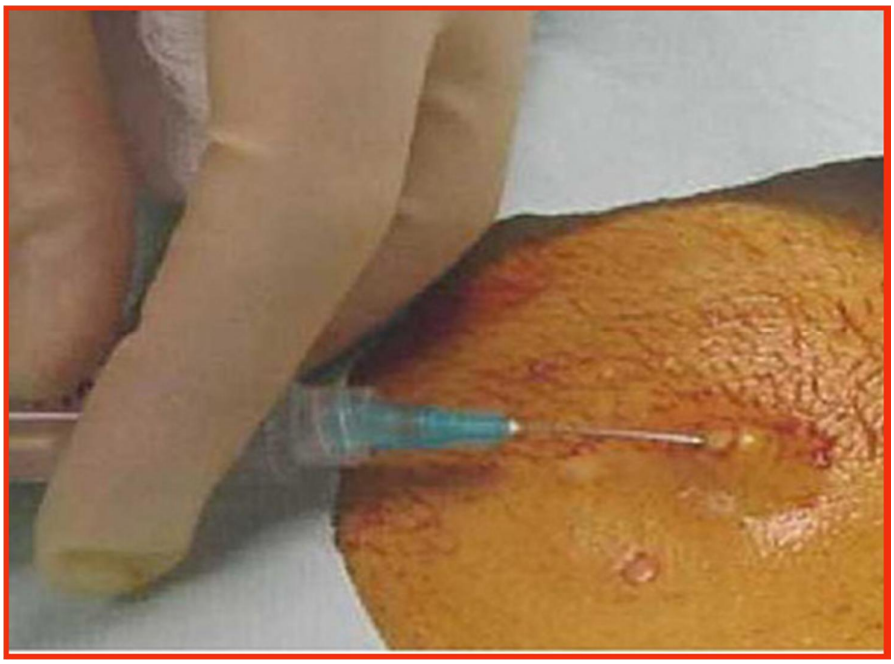
  Urine glucose

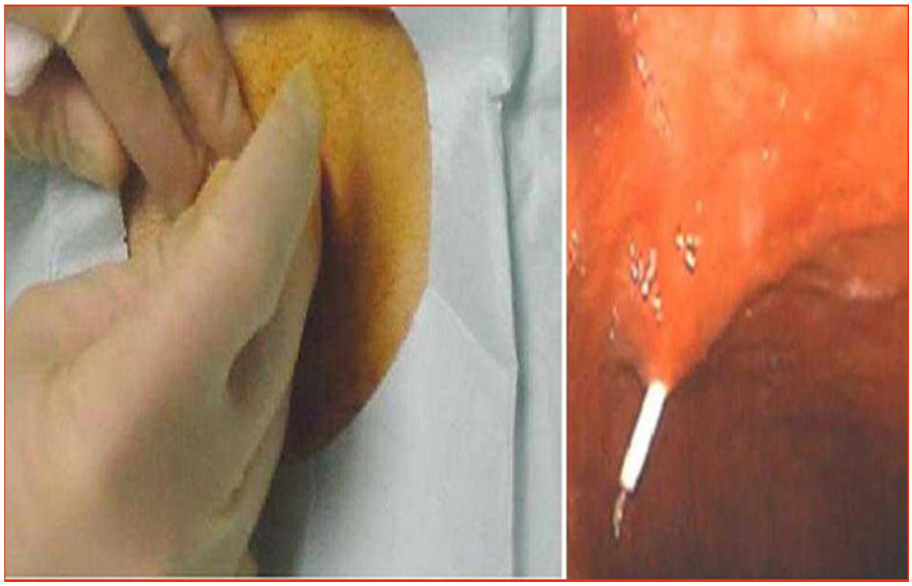
  Nitrogen balance

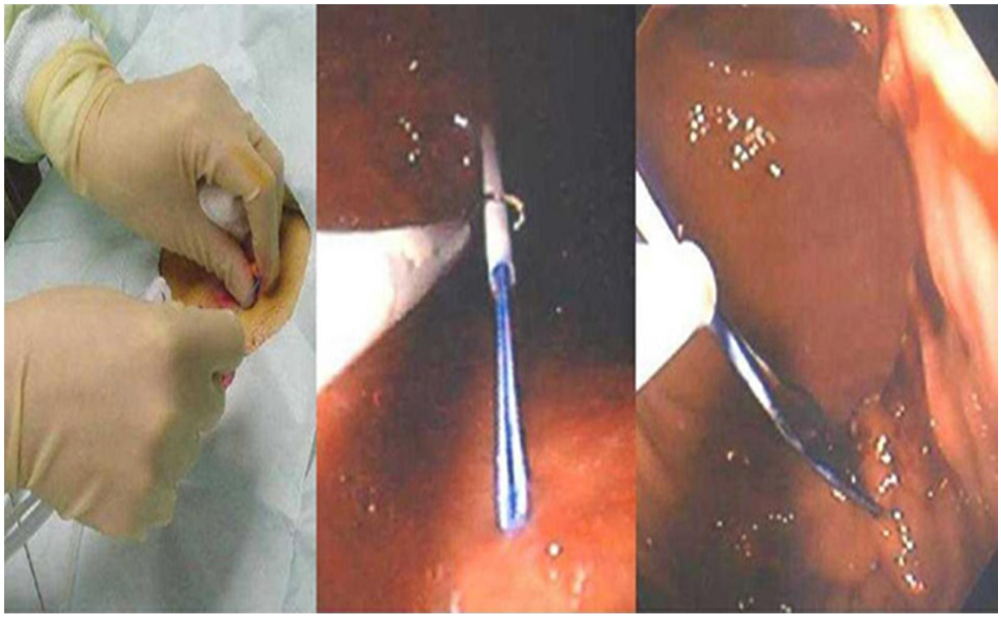
  Albumin & pre albumin

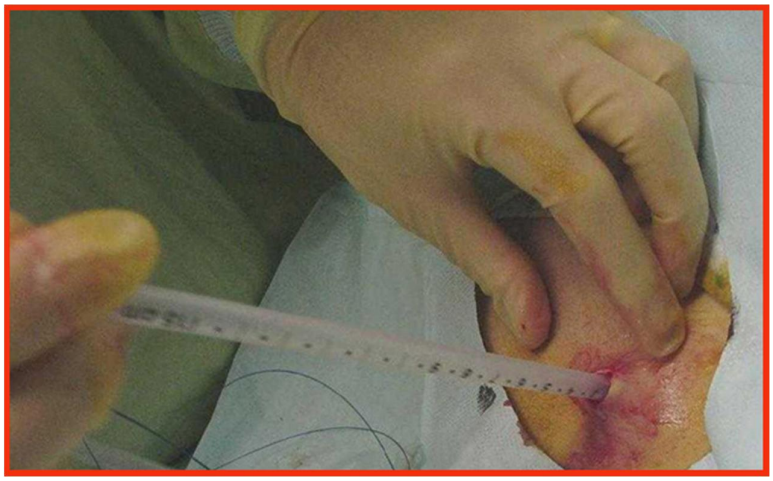
Patient tolerance for both gastric and jejunal feeds should be monitored closely in case of gastric feeding residual volumes seems to play a role in judging fees whereas in case of jejunal feeds it is not possible . gastric residual has to be checked every 4-5 hours and if it

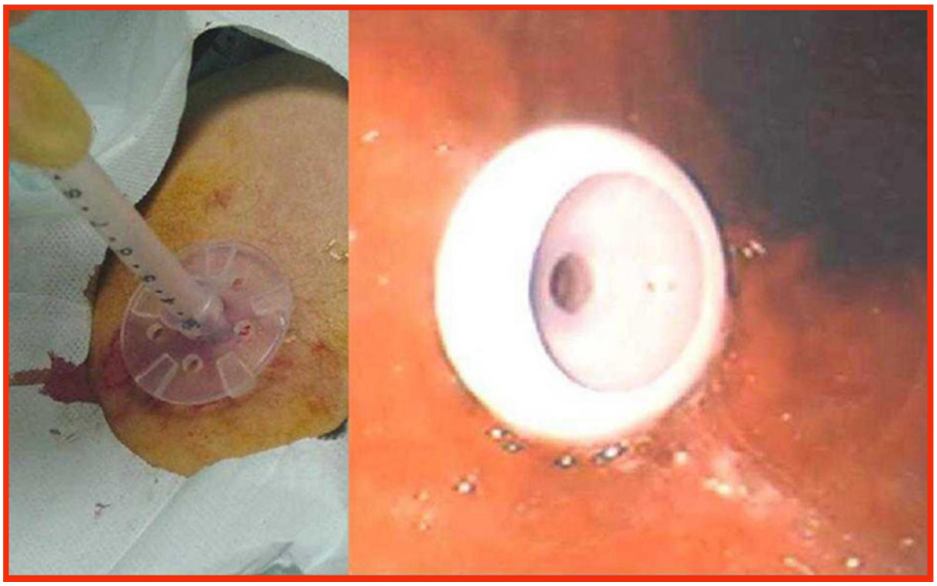
found to be greater than 200 cc , then feeding has to be withhold and again the residuals are to infused and checked after 2 hours . if patient complains of abdominal distention or vomiting , then feeds have to be stopped











Enteral feeding has to be stopped before any procedures in which patient is put in trendelenberg position , patient who were not intubated before procedures requiring general naaesthesia . this will reduce the incidence of aspiration which is associated with enteral nutritution

AIM

- The objectives of the study are
- Study the effects of early enteral feeding with those of conventional feeding management in patients undergoing intestinal anastomosis
- Compare the early enteral feeding and conventional feeding management
- Popularize early enteral feeding in patients undergoing intestinal anastomosis
- Compare patient compliances between early enteral feeding and conventional methods
- To reduce mean duration of hospitalization

ELGIBILITY

INCLUSION CRITERIA

All patients undergoing intestinal anastomosis

EXCLUSION CRITERIA

Patients who are immunocompromised

Patients with renal failure

Patients requiring critical care

Paediatric patients

METHODS

Patients patients who underwent intestinal anastomosis following surgeries like right hemicolectomy, low anterior resection, limited resection were selected post operatively , the patients in the study group were kept nil per orally for first 24 hours .the naso gastric tube was removed on the first post operative day invariably after 24 hours of surgery , subjects were started on sips of clear liquids orally, the amount was gradually increased as tolerated by the patient. The diet was stepped up to soft diet and to regular diet . A record was made of abdominal pain,

nausea , vomiting , and abdominal distention by the subjects during feeding

Record was made of the following

- type of anastomosis (sutured/stapled)
- time of removal of ng tube
- time of appearance of bowel sounds
- time of passage of flatus/ stool
- presence of surgical site infection
- duration of hospitalization

Patients in the control group were kept on maintenance intravenous fluids containing dextrose and saline . Nasogastric tube was removed and feeds were started orally as decided by the operating surgeon depending on the clinical condition of the patient and the presence of bowel activity . Post operative records of the same parameters were recorded .

SOURCE OF DATA

All patients who underwent intestinal anastomosis following surgeries like right hemicolectomy, low anterior resection, limited resection etc., in govt stanley hospital from may 2012 to november 2012 are included in the study

50 patients who underwent intestinal anastomosis were randomized into two groups ,

Study group : early feeding 24hours after surgery

Control group : conventional or delayed feeding after onset of bowel sounds / passing flatus .

Record were made on

- type of anastomosis (sutured/stapled)
- time of removal of ng tube
- time of appearance of bowel sounds
- time of passage of flatus/ stool
- presence of surgical site infection
- duration of hospitalization

- Patients compliances which included the following symptoms / signs in the post operative period

  Abdominal pain

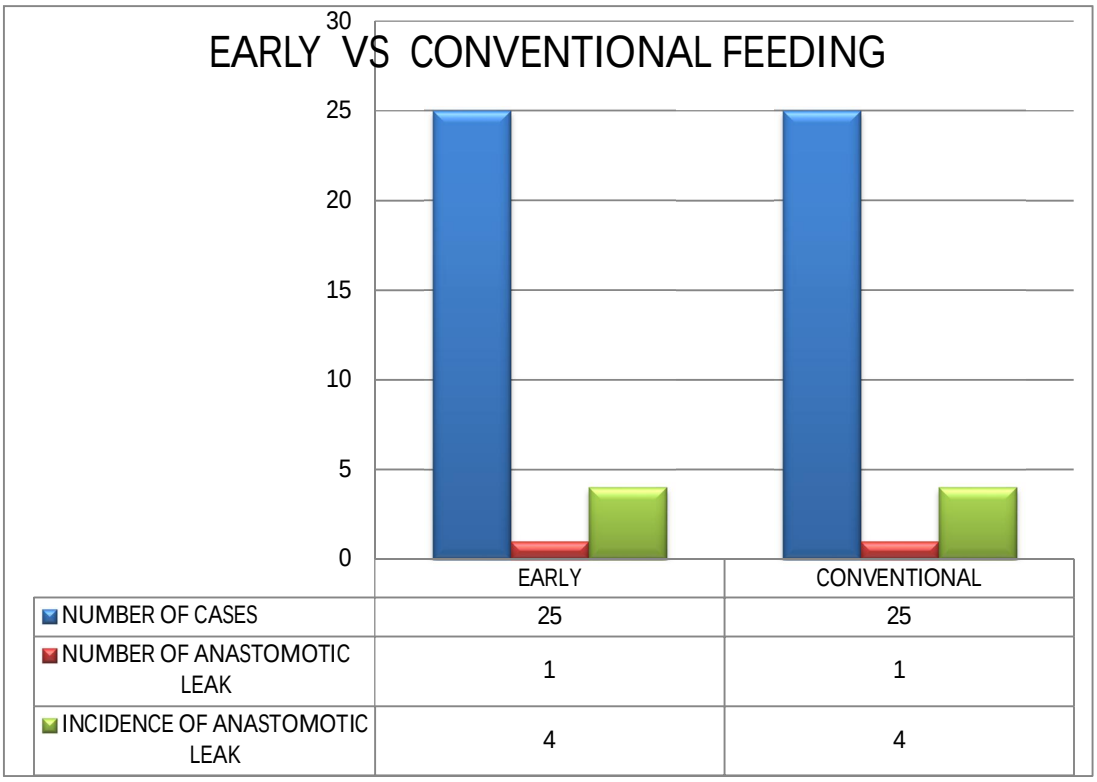
  Nausea

  Vomiting

  Abdominal distention

OBSERVATION AND RESULTS

Of the 50 patients who underwent intestinal anastomosis , 25 were started on early enteral feeding , and 25 on conventional feeding methods . Of the 50 patients 2 had anastomotic leak , 1 in the study group and 1 in the control group



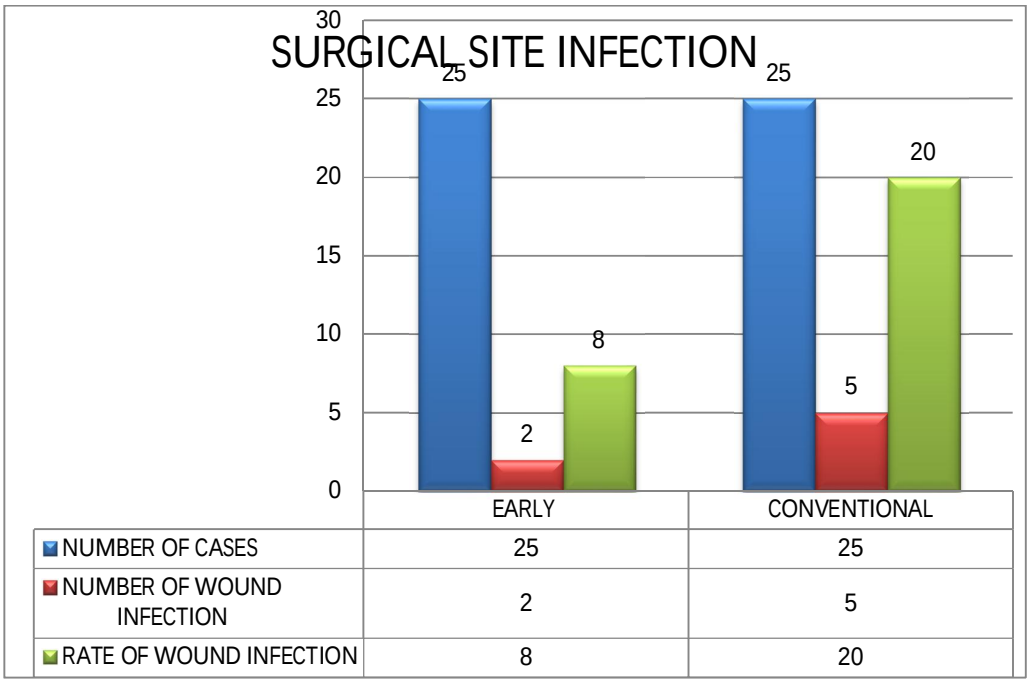
	EARLY	CONVENTIONAL
NUMBER OF CASES	25	25
NUMBER OF ANASTOMOTIC LEAK	1	1
INCIDENCE OF ANASTOMOTIC LEAK	4	4

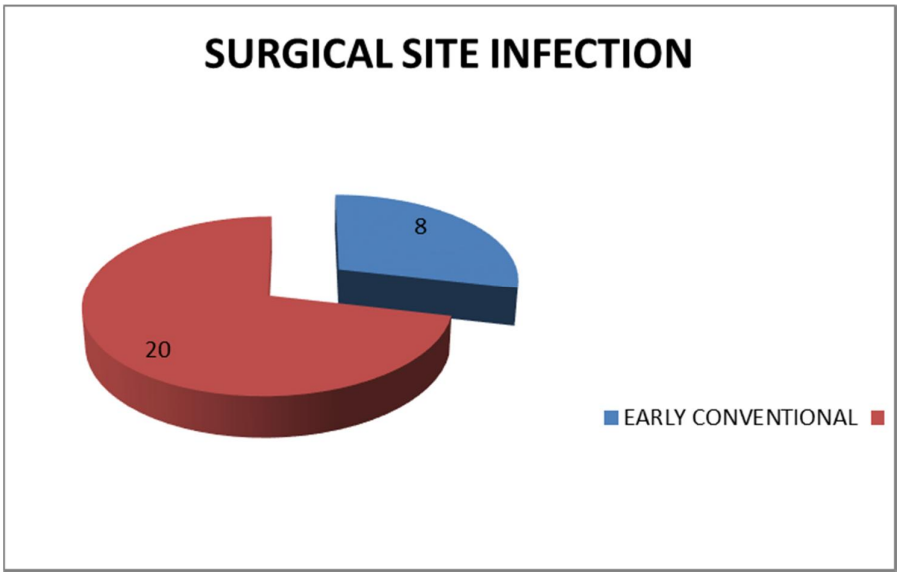
It is seen that the incidence of anastomotic leak in the both the groups were the same and with the p >0.9999 , and there the two groups were not statistically different from one another.

SURGICAL SITE INFECTION

Of the 50 patients studied , 7 patients had SSI with overall incidence of 14 % , of which 2 were in the study group (4 %) and 5 were in the control group (20 %).it is seen that the incidence of SSI was lower in patients started on early enteral feeding , though the two groups were statistically not different with the p 0.28.

TYPE OF FEEDING	NUMBER OF CASES	NUMBER OF SURGICAL SITE INFECTION	SURGICAL SITE INFECTION RATE %
EARLY	25	2	4
CONVENTIONAL	25	5	20

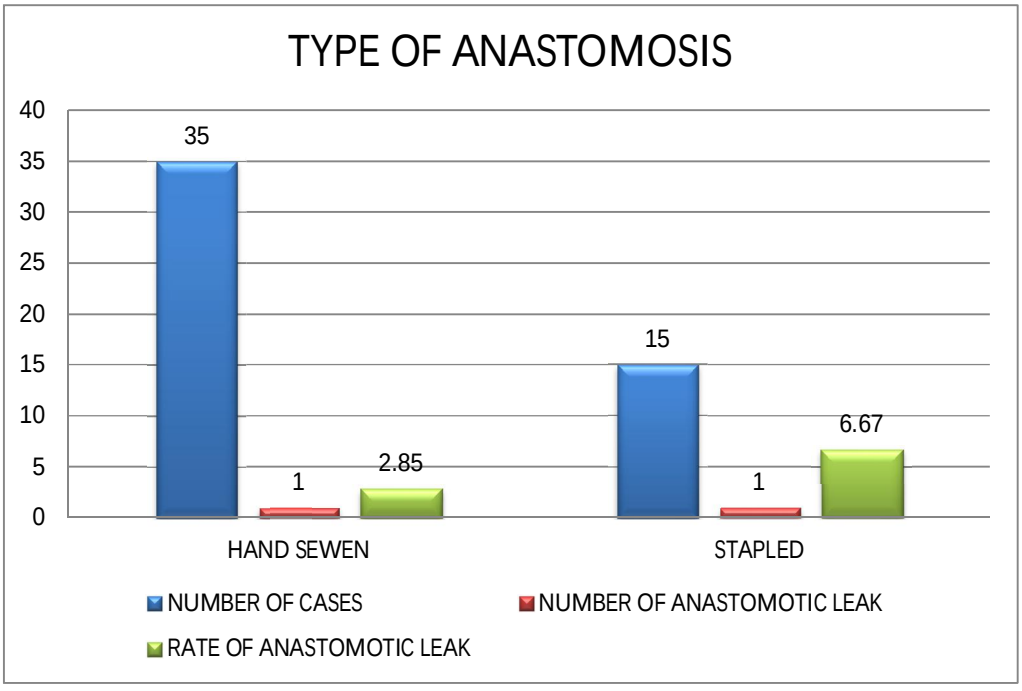



SURGICAL SITE INFECTION
8
20
EARLY CONVENTIONAL

TYPE OF ANASTOMOSIS

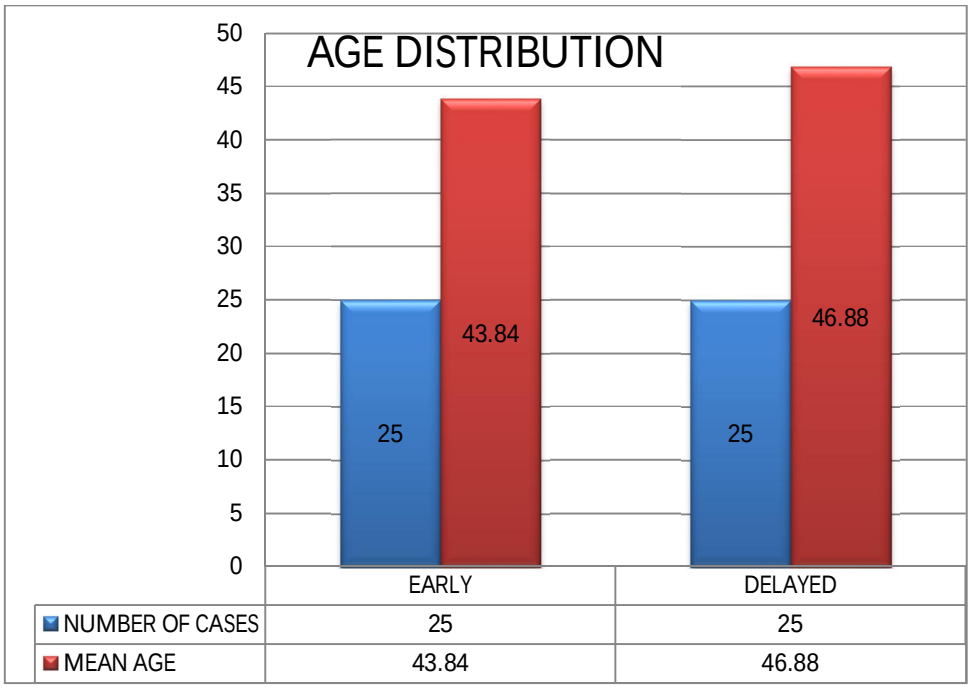
Of the 50 patients , hand sewen anastomosis in two layers was done for 35 patients and stapler anastomosi was done for 15 patients . 2 patient had anastomotic leak , of which one was observed in the hand sewen group (2.85 %) and one in the stapler group (6.67 %). The two group had a p value 0f 0.5479 and are not significantly different from each other.

TYPE OF ANASTOMOSIS	NUMBER OF CASES	NUMBER OF ANASTOMOTIC LEAKS	RATE OF ANASTOMOTIC LEAK %
HAND SEWEN	35	1	2.85
STAPLED	15	1	6.67



AGE DISTRIBUTON

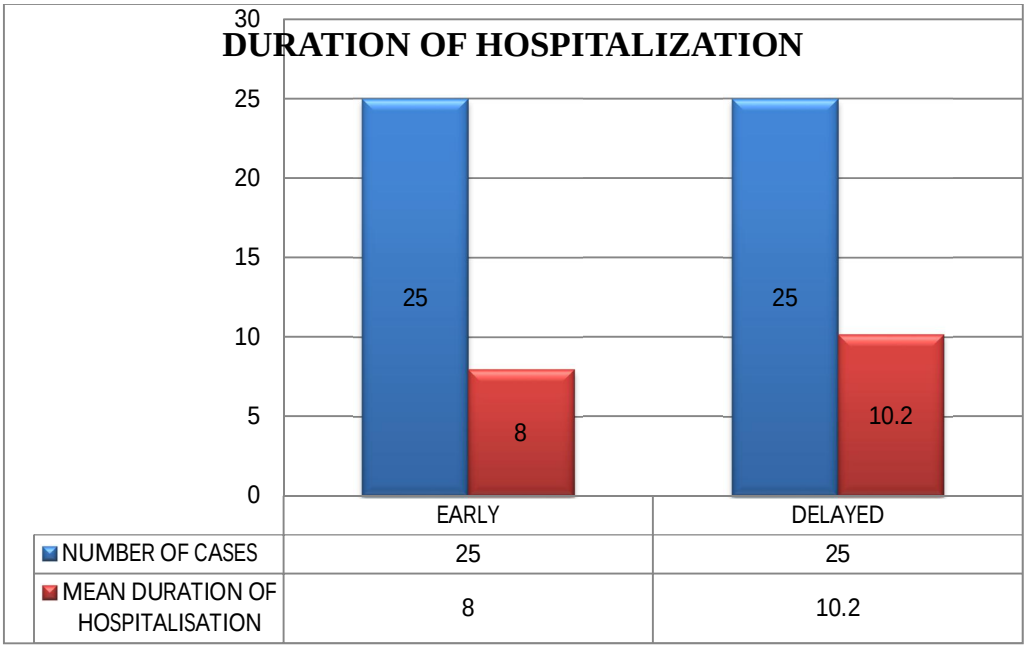
Below is the chart showing the age distribution in both the groups , The mean age of the study group is 43.84 , and the mean age of control group 46.88 , and the two groups were not significantly different



DURATION OF HOSPITALISATION

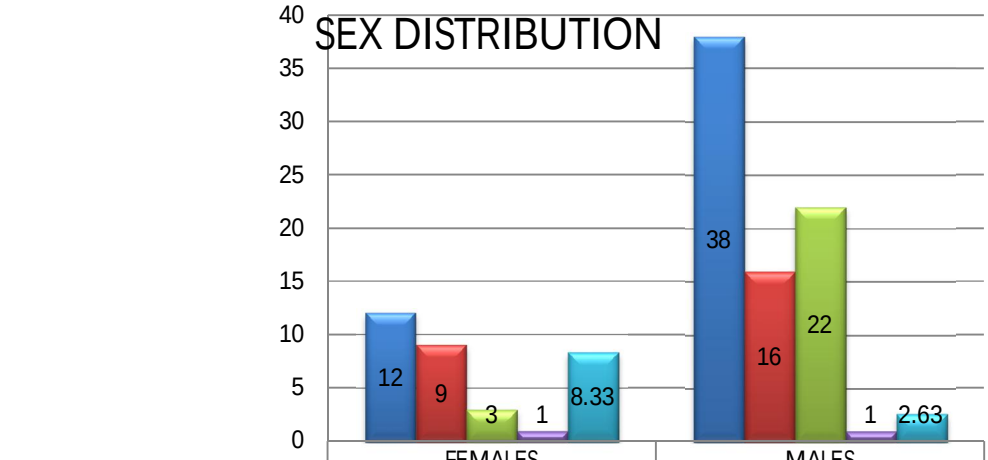
The duration of hospitalization of both the groups varied between 7 to 13 days with overall mean duration of stay of 9.1 days . Of which the mean duration of stay in study group was found to be 8 days , and that in the control group is 10.2 days . Although the two groups were not significant different p 0.6859 , it is noted that there is reduction in the

mean duration of hospitalization in study groups and there by indirectly minimizing the cost of treatment.



SEX DISTRIBUTION

Of the total number of 50 patients , 12 were females , of which 9 were started on early enteral feeding and 3 were on conventional feeding , with 1 patient showing anastomotic leak (8.33 %) . 38 were males , of which study group had 16 patients and control group had 22 patient , with one patient showing anastomotic leak (2.63 %).



	FEMALES	MALES
TOTAL	12	38
EARLY	9	16
DELAYED	3	22
NUMBER OF ANASTOMOTIC LEAK	1	1
INCIDENCE	8.33	2.63

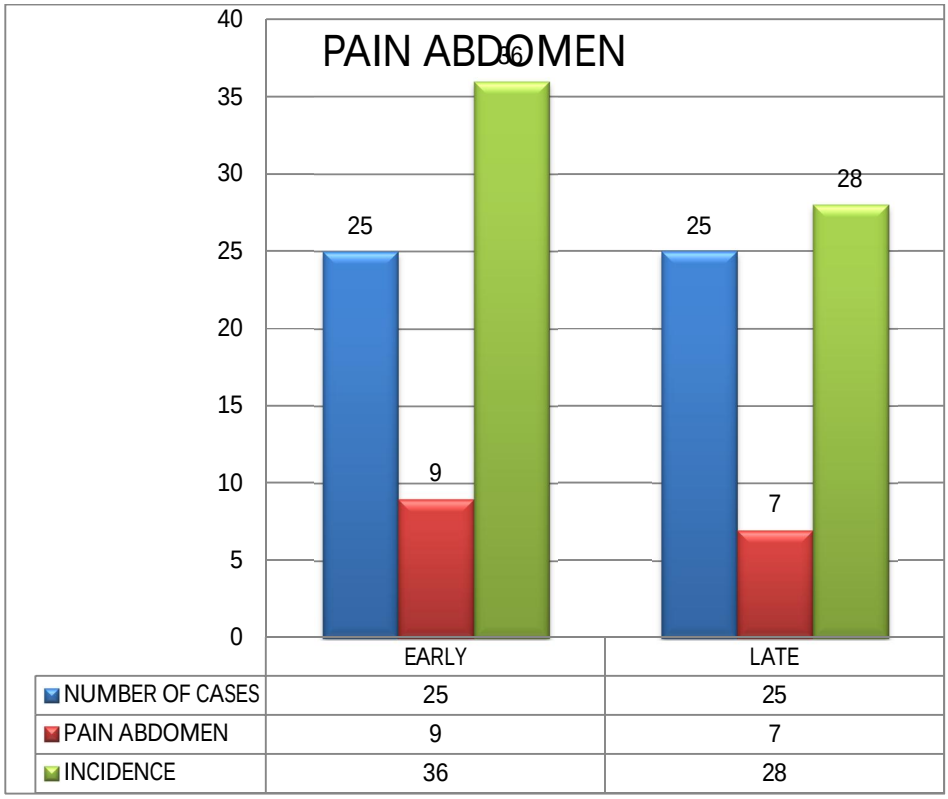
PATIENT COMPLIANCE

The following symptoms and signs are noted in both the study and control groups

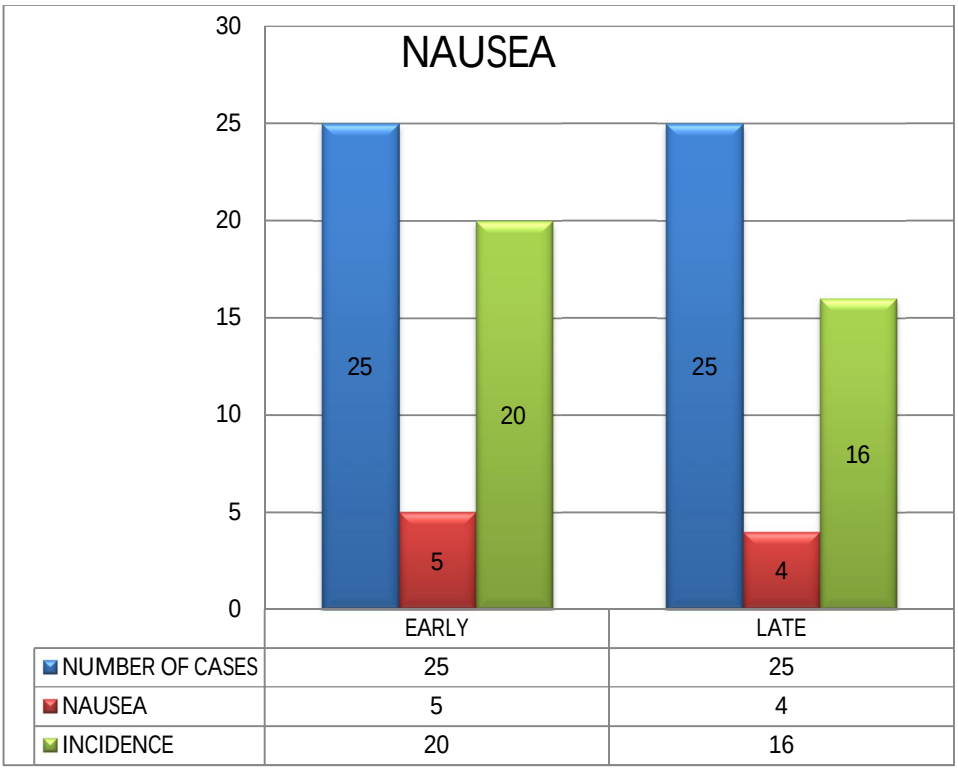
Abdominal Pain , Nausea , Vomiting , Abdominal distention

ABDOMINAL PAIN

Of the 25 patient in the study group , 9 had abdominal pain in the post operative period (36 %) , while 7 had similar complaint in the control group (28 %), the two groups were not significantly different p 0.6633

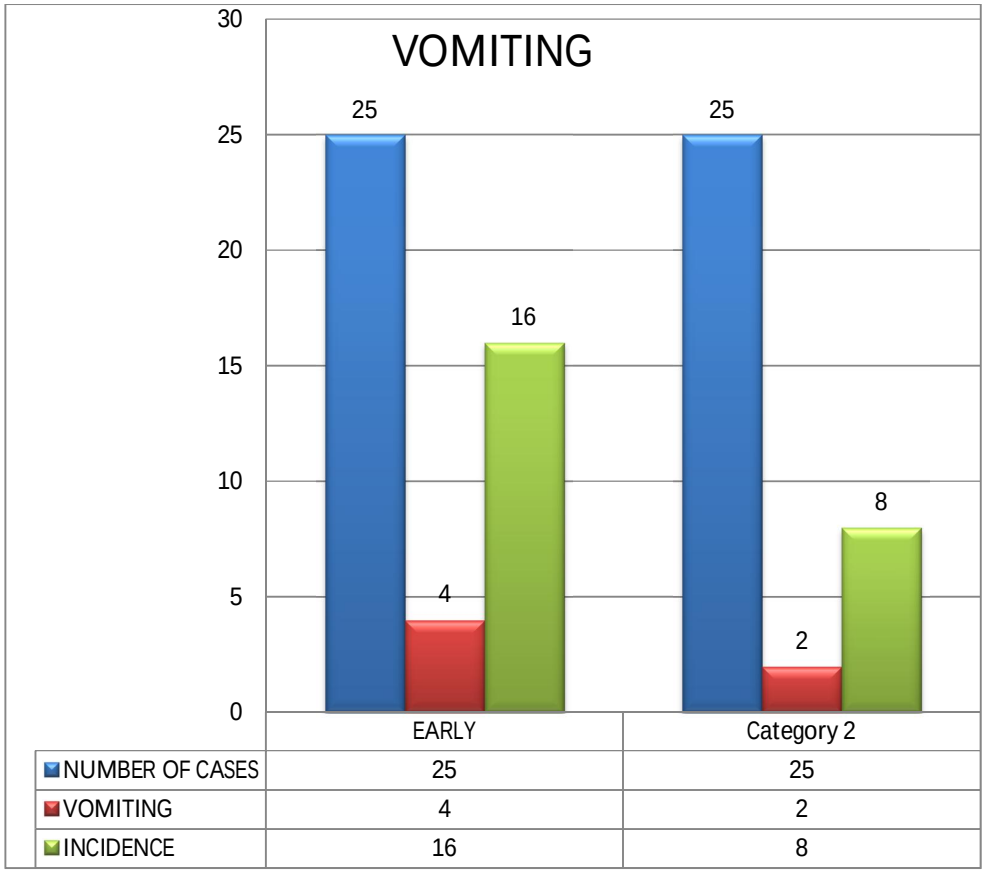


NAUSEA



Total of 5 patients in the study group had nausea (20 %) , compared with 4 patients in the control group (16 %) with a p value 0.7589 and groups were not significantly different

VOMITING

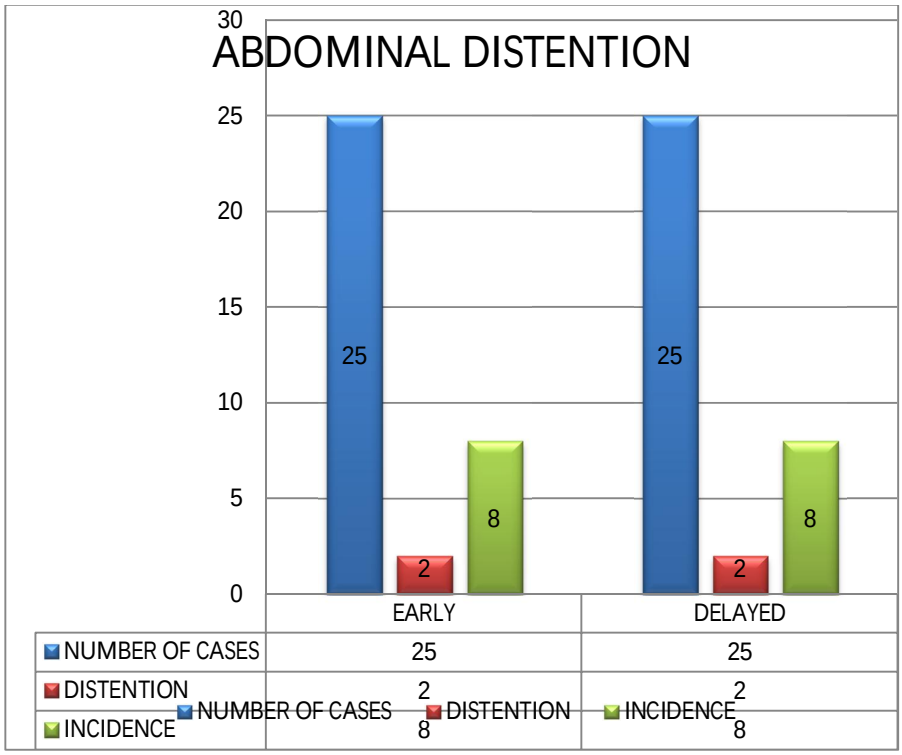


4 patient in the study group reported vomiting (16 %)

2 patient in the control group reported vomiting (8 %)

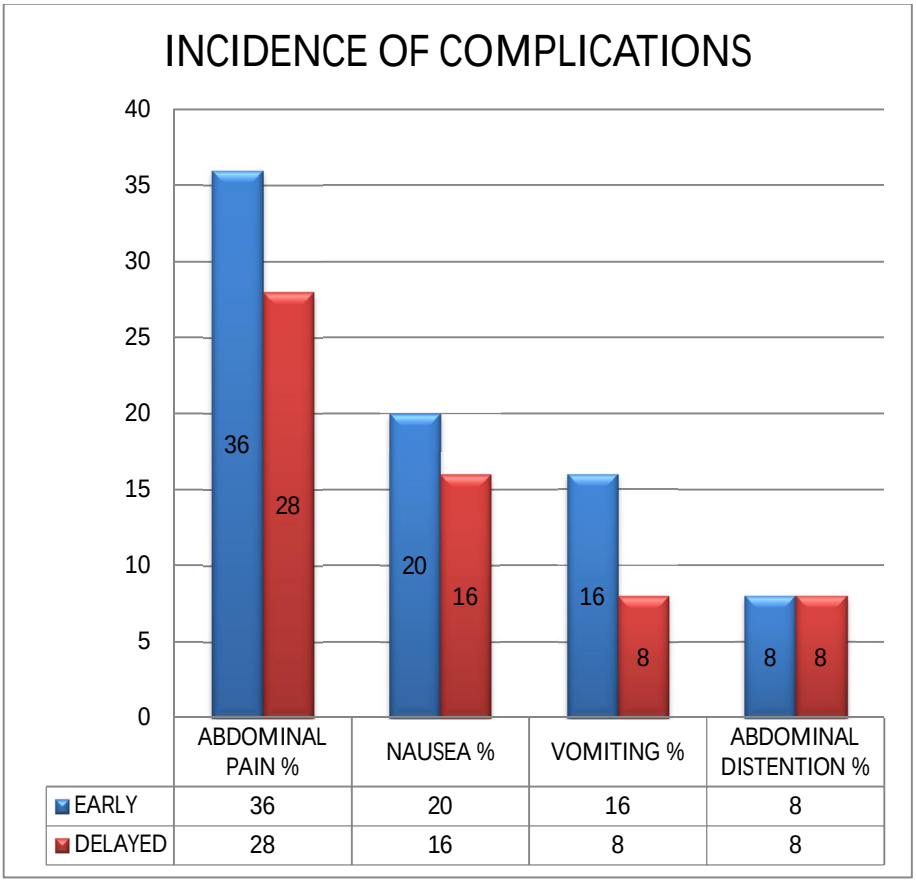
The groups were significantly not different

ABDOMINAL DISTENTION

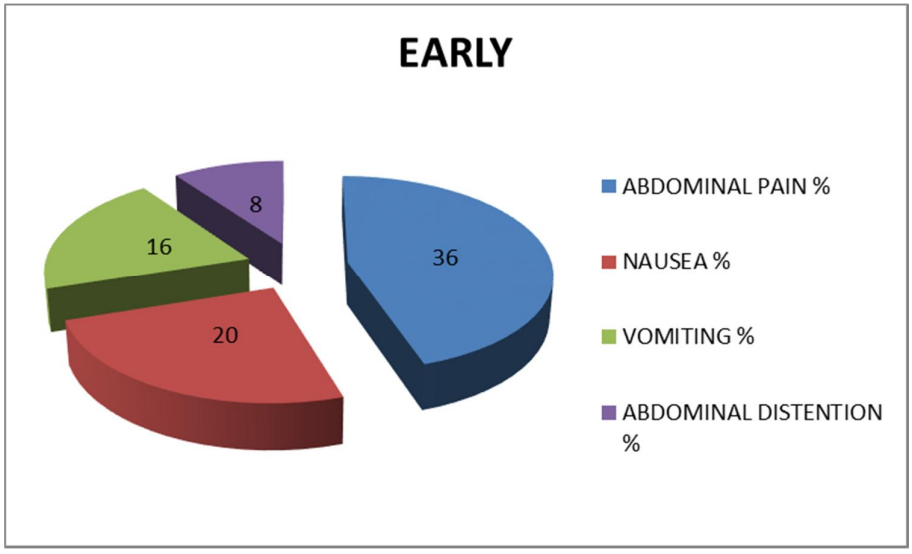


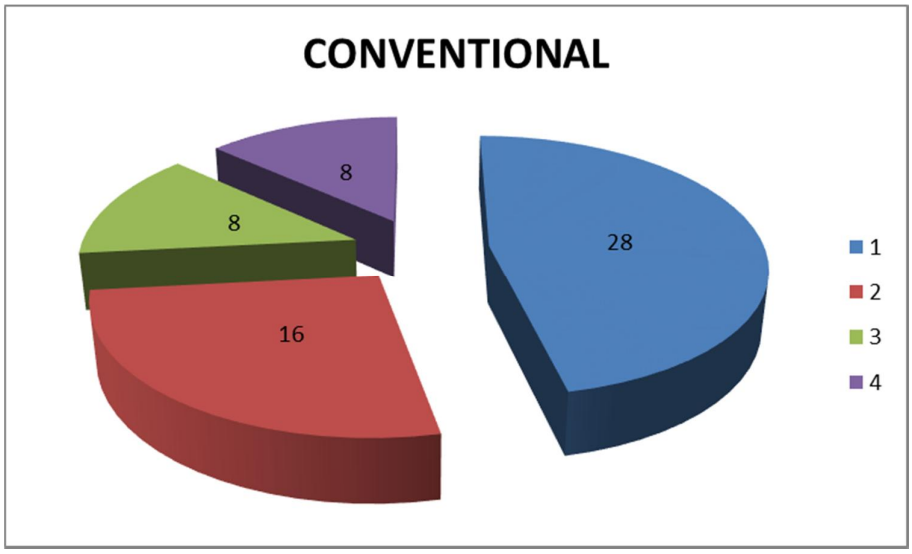
The incidence of abdominal distention in both the groups were the same , with no significance

PATIENT COMPLIANCE



	ABDOMINAL PAIN %	NAUSEA %	VOMITING %	ABDOMINAL DISTENTION %
EARLY	36	20	16	8
DELAYED	28	16	8	8




CONVENTIONAL
8
8
28
16
1
2
3
4

DISCUSSION

Conventional methods of feeding is the commonly practiced method of enteral feeding in post opearative patients undergoing gastrointestinal surgeries , even today . Traditionally it is believed nil per oral will provide with complete gut rest and aid in anastomotic healing and wound healing

In this study , a total of 50 patients , the mean age in the study group is 43.84, and the mean age in the control group is 46.88 , and there is no significant difference between the two groups. Of the 50 patients , 12 were females , 9 were started on early feeds and 3 in control group . 1 patient had anastomotic leak with an incidence of 11.11. 38 were male patients , 16 were started on early feeding and 22 in control group . 1 anastomotic leak noticed in control group with the overall incidence in males of 2.63

Of the 50 patients , hand sewen anastomosis was done in 35 patients of which 1 reported anastomotic leak with an incidence 2.85 . 15 patient underwent stapler anastomosis of 1 case of anastomotic leak was reported with and incidence of 6.67.

And the two groups were not significantly different.

Of the 50 patients , the duration of hospitalization varied from 7 to 13 days with a mean of 9.1 days. The mean duration of stay in the study group of 8 days and the mean duration of stay in the control group is 10.2 days. Although the two groups were not significantly different from one another , the mean hospitalization is reduced in study group

Number of reported cases of surgical site infection in study group is 2 with an incidence of 8. of the 25 cases in the control group , 5 cases of SSI was reported with an incidence of 20. Though the incidence of SSI was reduced in the study group , the two groups were not significantly different

In th study group of 25 patients , 9 cases of abdominal pain was noticed (36%) , 5 patients reported nausea (20 %) , vomiting was reported in 4 patients (16%) and 2 cases of abdominal distention was reported (8 %) . In the control group , abdominal pain was noticed in 7 patients (28%) , nausea in 4 patients (16%),

Vomiting was noticed in 2 patients (8%) and abdominal distention was reported in 2 (8 %). The complications seen in both the groups were not significantly different from one another.

This study shows that the conventional method of feeding in post operative patients following gastro intestinal anastomosis offers no clear

advantage when compared to early enteral feeds. Parameters like anastomotic leak/dehiscence, surgical site infection, and mean duration of hospital stay were not significantly different from one another.

LIMITATIONS:

Sex of the patient, type of surgery, pre-operative nutritional status were not matched individually to compare the outcome.

CONCLUSION

Anastomotic leak in both the groups was not signficantly different Rate of Surgical site infection was reduced in Early feeding group Mean duration of Hospitalization is less in early group compared to conventional group Patient compliance in both the groups were not significantly different .

The study failed to prove clear advantage of conventional feeding over early enteral feeding

SUMMARY

Conventional methods of feeding , though still widely practised , there are many studies which have shown that it offers no clear benefits compared early enteral feeding following gastrointestinal surgeries and still many studies have shown a clear benefit of early feeding compared to conventional methods.

In this study patients who have undergone intestinal anastomosis in Govt Stanley Hospital from May 2012 to Nov 2012 were randomly selected into two group . study groups were started on early enteral feeding 24 hours after surgery and control groups were started on conventional feeding methods after appearance of bowel sounds / passage of flatus as decided by the operating surgeon

In this study of 50 patients , incidence of anastomotic leak in study group and the control group were the same (4 %) , with two groups showing no significant difference (p >0.9999) . The mean age of both the groups, study (43.84) , control group (46.88) were not significantly different . The incidence of surgical site infection in the study group (8%) , compared to control group (20 %) was less in early feeding group although the two groups were significantly not different . the mean duration of hospitalization was 9.1 days with incidence study group

(8 days) and that of control group (10.2 days) . the length of stay is reduced in group started on early enteral feed , but the two groups were not significantly different .

Patient compliance between both groups showed that there is marginal increase in incidence of post operative nausea , vomiting in the study group although the two groups were not significantly different We summarise that anastomotic leak , the occurrence of surgical site infection, length of stay in hospital , patient compliance were not significantly different from both the groups and conventional method of feeding offers no clear advantage compared with early enteral feeding following intestinal anastomosis

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MASTER CHART

S.NO	NAME	IP.NO	AGE	SEX	DIAGNOSIS	PROCEDURE	HAND SEWN	STAPLER	REMOVAL OF NASO GASTRIC TUBE (POD)	RETURN OF BOWEL SOUND (POD)	FEEDING (POD)	TIME OF PASSAGE OF STOOL (POD)	WOUND INFECTION	HOSPITALIZATION (DAYS)	ANASTAMOTIC LEAK
1	BOOPATHY	20219	54	M	CA ASCENDING COLON	RT HEMICOLECTOMY	yes		4	3	5	7	PRESENT	13	
2	ZAHERIYA	42186	56	F	CA CAECUM	RT HEMICOLECTOMY	yes		2	2	2	4		9	
3	MURUGAN	46139	63	F	CA ASCENDING COLON	RT HEMICOLECTOMY		yes	2	3	2	6		8	
4	RENGANADHAN	21682	58	M	CA ASCENDING COLON	RT HEMICOLECTOMY		yes	2	2	2	5		9	
5	RAJESWARI	43768	54	F	CA ASCENDING COLON	RT HEMICOLECTOMY		yes	2	2	2	4		7	
6	KUMAR	43098	45	M	APPENDICULAR CARCINOID	RT HEMICOLECTOMY	yes		3	4	4	5		9	
7	DEVAKUMAR	43078	45	M	CA CAECUM	RT HEMICOLECTOMY		yes	2	2	2	5		8	
8	VELU	43780	34	M	CA CAECUM	RT HEMICOLECTOMY	yes		4	2	4	6	PRESENT	10	PRESENT
9	KUMERASAN	43124	45	M	APPENDICULAR CARCINOID	RT HEMICOLECTOMY	yes		2	4	2	4		9	
10	KALIAMMAL	24791	70	F	CA RECTUM	LOW ANTERIOR RESECTION	yes		2	3	2	6		9	
11	LASKSHMI	32925	23	F	CA RECTUM	LOW ANTERIOR RESECTION		yes	2	2	2	5	PRESENT	7	
12	DHANIKASALAM	31249	24	M	ACUTE INTESTINAL OBSTRUCTION	ADHESIOLYSIS / RESECTION ANASTOMOSIS	yes		4	4	5	8	PRESENT	12	
12	EZHILARASI	34589	35	F	ACUTE INTESTINAL OBSTRUCTION	ADHESIOLYSIS / RESECTION ANASTOMOSIS	yes		4	4	5	7	PRESENT	12	
13	SATHYAVANI	41557	43	F	CA RECTUM	LOW ANTERIOR RESECTION	yes		2	2	2	5		7	
14	KUMARAN	43657	22	M	CA RECTUM	LOW ANTERIOR RESECTION	yes		3	3	4	7		9	
15	SAROJA	50283	55	F	CA RECTOSIGMOIDAL GROWTH	LOW ANTERIOR RESECTION	yes		3	3	4	6		10	
16	TAMILARASAN	34425	27	M	CA RECTUM	LOW ANTERIOR RESECTION		yes	2	2	2	5	PRESENT	8	
17	UTHIAN	347 91	59	M	CA RECTUM	LOW ANTERIOR RESECTION		yes	2	2	2	6		7	
18	MALAR	30876	50	F	CA RECTUM	LOW ANTERIOR RESECTION	yes		2	2	2	5		9	PRESENT
19	ASHOK	27860	37	M	CA RECTUM	LOW ANTERIOR RESECTION		yes	4	4	5	6		8	
20	ARUMAI GANDHI	20338	40	M	RECTO SIGMOIDAL GROWTH	LOW ANTERIOR RESECTION	yes		3	3	5	7		9	
21	VELAYUDHAM	43059	53	M	RECTO SIGMOIDAL GROWTH	LOW ANTERIOR RESECTION	yes		3	3	5	7		9	

22	ARUN SATISH	34589	23	M	CAECAL MASS	LIMITED RESECTION &ANASTAMOSIS	yes		4	4	5	7	PRESENT	10	
23	VENUGOPAL	42887	40	M	CA RECT SIGMOIDAL GROWTH	LOW ANTERIOR RESECTION		yes	2	2	2	5		7	
24	MANIKKAM	45098	62	M	CA RECTUM	LOW ANTERIOR RESECTION	yes		3	3	5	7		8	
25	RAMAN	43089	68	M	CA RECTUM	LOW ANTERIOR RESECTION	yes		4	4	5	8		9	
26	KUPPUSWAMY	49087	57	M	CA RECTOSIGMOIDAL GROWTH	LOW ANTERIOR RESECTION		yes	2	2	2	4		8	
27	JAYANTHI	38983	17	F	MECKEL'S DIVERTICULITIS	RESECTION ANASTOMOSIS			2	2	2	5		7	
28	KUTTAN	37890	65	M	ACUTE INTESTINAL OBSTRUCTION	RESECTION ANASTOMOSIS	yes		4	4	5	7		12	
29	SHANMUGAM	34601	45	M	ILEAL STRICTURE	RESECTION ANASTOMOSIS	yes		3	4	4	6		10	
30	CHITHIRAI	35969	60	M	ILEAL KNOTTING	RESECTION ANASTOMOSIS	yes		5	5	6	8		12	
31	LOGESH	38310	12	M	MECKEL'S DIVERTICULITIS	RESECTION ANASTOMOSIS	yes		2	2	2	4		7	
32	VIJAYAN	40289	60	M	INTESTINAL OBSTRUCTION	RESECTION ANASTOMOSIS	yes		4	4	5	7		10	
33	KALI	44343	20	M	PERFORATED GIST JEJUNUM	RESECTION ANASTOMOSIS	yes		2	2	2	4		9	
34	PRAGALATHAN	54757	37	M	ETRATING INJURY - ILEAL LACERA	RESECTION ANASTOMOSIS	yes		4	4	5	7		10	
35	SAIBABA	51243	58	M	TRANGULATED INGUINAL HERNI	RESECTION ANASTOMOSIS	yes		4	4	5	7		12	
36	AMEER BASHA	26165	54	M	GASTRO DUODENAL GROWTH	LIMITED RESECTION &ANASTAMO		yes	2	2	2	5		8	
37	ELUMALAI	22369	68	M	TB SIGMOIDAL STICTURE	RESECTION &ANASTAMOSIS		yes	2	2	2	5		8	
38	ROJA	22610	40	F	MEKELS DIVERTICULAM	RESECTION &ANASTAMOSIS		yes	2	2	2	6		8	
39	MARIAMMAL	21893	25	F	TB SIGMOIDAL STICTURE	RESECTION &ANASTAMOSIS	yes		4	4	5	7		10	
40	JAYAMMA	24020	70	F	CAECAL MASS	LIMITED RESECTION &ANASTAMO	yes		4	4	5	7		9	
41	VENNILA	43657	43	F	MESENTRIC CYST	RESECTION &ANASTAMOSIS		yes	2	2	2	4		8	
42	ANANDAN	32543	34	M	ILEO-CACAL MASS	LIMITED RESECTION &ANASTAMO		yes	2	2	2	5		8	
43	GANESAN	38793	25	M	ILEAL PERFORATION	RESECTION ANASTOMOSIS	yes		4	4	5	7		12	
44	PREM KUMAR	40987	36	M	ILEO-CACAL MASS	LIMITED RESECTION &ANASTAMO	yes		3	3	4	6		10	

45	MENATCHI	32098	56	M	TB SIGMOIDAL STICTURE	RESECTION &ANASTAMOSIS	yes		4	4	5	7		11	
46	KUPPAN	43209	56	M	INTUSSUPTION&RIF MASS	LIMITED RESECTION &ANASTAMO	yes		4	5	5	7		9	
47	MURUGAN	40997	34	M	MEKELS DIVERTICULAM	RESECTION &ANASTAMOSIS	yes		2	2	2	4		7	
48	KANNAN	45908	63	M	SIGMOID GROWTH	RESECTION &ANASTAMOSIS	yes		4	4	5	7		12	
49	BULLAIAH	52367	50	M	ILEAL GIST	RESECTION ANASTAMOSIS	yes		2	2	2	5		9	
50	SELVARAJ	49567	34	M	ILEAL PERFORATION	RESECTION ANASTAMOSIS	yes		2	2	2	5		9	

PROFORMA

A STUDY ON EARLY ENTERAL FEEDING IN CASES OF INTESTINAL ANASTAMOSIS

Patient details

Name:

Age/Sex:

IP No:

Date of Admission:

Operative Procedure:

Date of Surgery:

Date of Discharge:

WEIGHT AT ADMISSION : **WEIGHT AT DISCHARGE :**

Address:.....

.....

.....

..... **Phone number:**.....

Occupation: **Rural / Urban**

Socioeconomic Status: Upper / Upper middle / Lower middle /Poor

INDICATION FOR SURGERY

ELECTIVE / EMERGENGY

ASSOCIATED WITH FEATURES OF SEPSIS

Family History:

Past History: DM / HT / Asthma / TB / Other (Surgery)

TYPE OF ANASTAMOSIS : SUTURED

SINGLE LAYER

TWO LAYERS

STAPLED

POST OPERATIVE

Nausea

Vomiting

Abdominal Pain

Abdominal Distention

Time of removal of nasogastric tube

Time of appearance of bowel sounds

Time of passage of flatus / stools post operatively

Features of sepsis which included temperature, pulse rate & total leukocyte count

Presence of wound infection

Weight on the fifth day of surgery, at the time of discharge